

COAL AGE

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No. 25

Have you ever stopped to consider how much depends upon the accuracy of the small scale on your tipple, which is used for weighing all of the mine cars?

In most cases, no accurate check can be obtained against the mine weights, because the coal before reaching the railroad scales has to be picked and washed, or possibly be subjected to both treatments, and in this separation process, various errors creep in. However, in spite of this fact, many coal companies have no systematic method of testing the accuracy of their tipple scales, nor the tare weight which is credited to the empty cars.

Every now and then, you will hear of a local union calling its men out on strike, as a protest against errors in weights, and the history of such disagreements is generally about as follows:

An auditor, in checking over mine weights according to pay-rolls, against receipts from coal sales over a period of several months, finds a noticeable discrepancy. The manager is notified and immediately takes the question up with the local superintendent. The superintendent warns the company weighman that unless he watches his weights more closely, someone will be minus a job. The company weighman and the miners' check weighman (if there happens to be such an individual around) test out the scale with test weights and find them a little out of balance. They agree to adjust them and, as a sort of compromise to the company for the shortage of the previous two months, decide to lean the company's way for a time.

Here's the result:

Miners notice a difference in their weights, question the check weighman and become suspicious of his manner, elect a new check weighman, demand a new test to be made for determining the tare weights of all of the cars, demand a few other things, such as stopping the cars on the scale for a longer time and finally end up by declaring a strike,

Ponder a minute if you please, as to what might have occurred over a period of several months, to have affected the weights. Here are a few possible happenings:

1.—The weighman might have been dishonest and credited coal to a dummy.

2.—The *railroad* scales might have been out of adjustment for a time and then readjusted without the mine official's knowledge.

3.—The average tare weight of the cars might have been affected by repairs to a number of old cars, or by changes in the type of wheels in use.

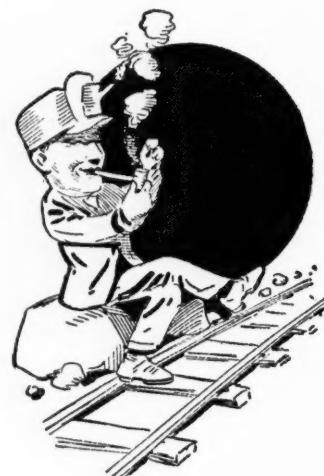
4.—The weighman might simply have been careless.

5.—A considerable amount of coal might have been stolen off the loaded railroad cars, between the time they were loaded and the time of weighing on the railroad scales. (This often happens during the winter months, at camps where no check is made on the domestic coal sales.)

Moral—Don't let errors accumulate until they become so large as to excite you unduly and upset your better judgment.

An Epitaph

BY BERTON BRALEY
Written expressly for Coal Age



*Here Lies
ANTONIO HOROWITZ
Or What is Left of Him,
He Was a Man
of
Splendid Build
of
Vigor and of Vim.*

*He Never Feared to
TAKE A CHANCE
Wherever He Might Be,
He'd
TAKE A CHANCE
The Roof Was Safe
He Would Not Look
To See.*

*He'd Use a Drill
To
Tamp a Charge
And
TAKE A CHANCE
on
That,
He'd Smoke in Any Gassy Place
He
Happened to be At.*

*And
When He Rode Upon The Cage
He Would Not
Grasp
The Bar,
He Never Looked Upon
The Board
Where
RULES OF SAFETY
Are.*

*But, Being Full of Health and Strength
And Quite Devoid of Fear
He Played at Hide and Seek
With
DEATH
And Now He's Lying
Here.*

*He TOOK A CHANCE
With Dynamite
He
TOOK A CHANCE
With Damp,
And in the Very PRIME OF LIFE
Fate Snuffed His
Miner's Lamp;*

*He's Done With
TAKING CHANCES
Now
He's Done with Mines and Such,
And What is Left of Him
Lies Here—*

HE TOOK ONE CHANCE TOO MUCH.

Historical Sketch of the Georges Creek Coal Region

BY R. A. WALTER*

SYNOPSIS—A history of the Georges Creek field from its earliest settlement. Coal was probably found by the Indians and it is said Braddock's army burned it on their march West. But not until the railroads and the canal were built did the tonnage increase to 2000 tons per year. The methods of the primitive miners are described as also the steps by which transportation and operation were placed on a stable footing.

The Georges Creek Coal basin lies almost wholly in the western part of Allegany County, Maryland, in the valley between Dan's and the Savage Mountains. The synclinal axis of this canoe-shaped basin extends from a point four miles north of the Pennsylvania State line, south 27 deg. west, 25 miles to Westernport, the basin maintaining an average width of six miles. The upper Potomac basin, southwest of Westernport, is geologically

of the field, the struggles of the mine owners, the introduction of railroads and canals, the formation and growth of the coal companies and the mining methods of different periods will be briefly dwelt upon.

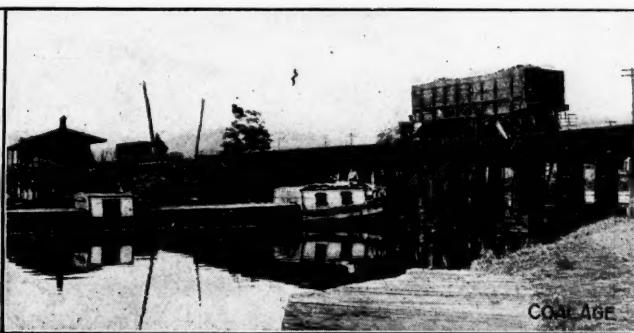
CUMBERLAND SETTLED IN 1750

Allegany County, Maryland, is especially rich in general historical details, very complete authentic history dating back to 1749 being readily obtainable. In that year a patent was granted to what was known as the Ohio Co., for 500,000 acres south of the Ohio, between the Monongahela and Kanawha Rivers and west of the Alleghenies. This company immediately began an exploration of the country and in 1750 built a trading post at Wills Creek—now Cumberland.

In 1751 a trail, from this trading post, west across the Georges Creek Valley, thence north to the present site of



A canal paralleling the Potomac and largely used for conveying Georges Creek coal to Georgetown



Loading dock at Cumberland, Md., on the Cumberland & Pennsylvania R.R. and the canal

THE CHESAPEAKE & OHIO CANAL

a continuation of the Georges Creek basin, but has always been commercially considered as distinct and separate from the Georges Creek field.

Frostburg, the largest town in the region, is located on the synclinal axis of the basin, 11 miles west of Cumberland, 5 miles south of the Pennsylvania State line and 10 miles south of the northern end of the basin. It is situated on the divide between Jennings Run, which drains the north end of the basin, and Georges Creek, which drains its south end. From the latter creek, the field derives its name.

Eckhart, Loartown and Vale Summit are located near the eastern edge of the basin on the headwaters of Braddock's Run, which flows through Short Gap, a break in the coal-bearing measures, about three miles east of Frostburg, thence eastwardly to Wills Creek a short distance above Cumberland. Mount Savage and Barrelville lie northeast of Frostburg, near the northern limits of the basin. Midland, Lonaconing, Barton and Westernport being located southwest.

Space does not permit a history of the field in detail, but only such events are noted as were of importance to the general development of the region. The early history

Pittsburgh, was marked by Colonel Thomas Cresap accompanied by Nemacolin, an Indian guide. This trail was used by George Washington, on his expedition against the French in 1753, and improved by him to such an extent that after his return over the same route in the following year, it had become a fairly passable road. It was again used after the completion of Fort Cumberland in 1755 by General Braddock on his ill-fated attempt to capture Fort Duquesne, and has since been known as the Braddock Road.

Notwithstanding Washington's protest, Braddock halted to "level every mole-hill and bridge every brook." As everyone familiar with early American history knows, these delays were primarily responsible for his defeat by the French and Indians. His road-building operations, however, were of great benefit to the Georges Creek and other regions lying west of Fort Cumberland by opening to settlers this hitherto inaccessible country.

GEORGES CREEK SETTLED BEFORE REVOLUTIONARY WAR

It is believed that the first settlement in the Georges Creek Region was made near Loartown, shortly after Braddock's retreat. However, very few settlers moved west of Fort Cumberland until after 1768, as the French-Indian allies were terrorizing the whole frontier by their

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massacres. About 1768, the Indians were subdued and a stream of settlers began pouring westward to the fertile lowlands along the Ohio. Quite a few of these stopped along the way, the pioneer settlers of the Georges Creek region being recruited from their ranks. After 1788, the awarding of over 4000 military lots west of Fort Cumberland, to soldiers of the Revolution, was the greatest factor in populating this region until the development of the coal industry began.

Braddock's Road, from incessant use, eventually became almost impassable. No provision was made, nor were funds available, for its repair, and its condition after 50 years' use can readily be imagined. The need for a good road was realized by such men as Washington, Clay and others, who earnestly advocated and supported the project. In 1806, the National Government authorized the building of a turnpike from Cumberland to Wheeling. This road reached the Georges Creek region in 1814 and gave the flow of emigration renewed impetus.

DISCOVERY OF COAL DEPOSITS

Little is known about the discovery or early development of the coal deposits in the Georges Creek region. Tradition states that the Indians, in their early inter-

M. Bonne bearing date 1782. As this map was made in France from information previously acquired in America and as the map shows a coal mine at the mouth of Georges Creek, the existence of coal in this vicinity must have been known sometime prior to that date.

During the next 28 years, mention is made but once of the occurrence of coal in this region. However, the country was rapidly being cleared and settled and it is likely that during this period the outcrops of the coal seams were exposed at a number of places and the coal mined for local use. It is reported that in 1810 there was an exceptionally violent freshet, which washed the earth off a considerable area of a large coal seam—probably the Pittsburgh or Big Vein—near Barton. The exposure of this coal is supposed to have caused great excitement and people came for miles to see it. Some of the more enterprising dug it up and hauled it by wagon as far east as Romney and even Winchester, where it was used for smithing purposes. Later it was hauled to Westernport only, and there loaded in flatboats and rafts and floated to Washington.

EARLY INDUSTRIAL AND OTHER USES

In the report of the United States Geological Survey



CONSOLIDATION NO. 10—A TYPICAL SMALL SEAM MINE IN GEORGES CREEK VALLEY

course with the white settlers, sometimes referred to a black stone found here which burned like wood. From the same source we also hear that the soldiers of Braddock's army in passing through this region on their ill-fated march in 1755 to Fort Duquesne, discovered coal and burned some in their camp fires. Captain Orme, who kept a fairly comprehensive record of the happenings on this expedition, makes no mention of the presence of coal, but it is certain that the excavations made for the Braddock Road on the steep hill-sides directly on the outcrop of large seams, exposed the fuel to view. Whether it was recognized as coal must remain an unsettled question.

FOR A LONG TIME AFTER DISCOVERY IT WAS NOT MINED SYSTEMATICALLY

The first authentic record of the discovery of coal in the Georges Creek region is noted on a map made by

FREIGHT YARDS OF THE CUMBERLAND & PENNSYLVANIA R.R. AT MT. SAVAGE, MARYLAND

the statement is made that coal was first discovered near Frostburg in 1804. According to Schaf's "History of Western Maryland," the first coal mined in the region was taken from the Sheetz Farm, 1½ miles east of Frostburg—date not given—and hauled to Cumberland. Both of these references probably are to the same mine. It is certain that the mine on the Sheetz Farm was operating in 1816, for at that date the coal from this working was used in Cumberland in the manufacture of glass.

Again, we have the record that during the construction of the National Turnpike in 1814 coal was found at Eckhart, which must have been in the same general vicinity as the mine just mentioned, and wagoned to Cumberland and other points as far east as Baltimore.

The small amount of coal which thus reached the markets was of excellent quality and gave such satisfaction that a demand was created for all that the mine owners

could deliver. To transport coal by wagon without having any return freight was uneconomical, hence it was carried in this way only when the teamster desired to bring back with him a load of supplies.

BOATING COAL ON THE UNIMPROVED POTOMAC

This, of course, did not satisfy the demand and, as railroads were then unknown and no other means of transportation available, the mine owners began shipping the coal in boats. These boats were flat-bottomed, with square raking ends, and were about 80 ft. long, 13 ft. wide and 3 ft. deep, and held from 50 to 60 tons. They were poorly constructed and clumsy. The combined efforts of the entire crew of four men were required to steer them.

A practical means of transportation having now been discovered, more mines were opened and operated intermittently throughout the year, the coal being hauled by wagon to Cumberland where it was unloaded near the present municipal pumping station on Green Street, and stored in large piles on the river bank awaiting a freshet of sufficient height to float the boats with safety. These were generally built on the banks of Wills Creek of the

uncertain and it could be readily perceived that no systematic and profitable development of the coal seams could be expected unless the carrying facilities were improved. The need for some cheap method of transporting freight had been realized many years before, and well organized efforts had been made to secure it. Washington can be considered as the originator of these movements. On his several journeys through the region between Cumberland and the Ohio Rivers, he had been impressed with its wonderful natural resources and it was owing to his personal efforts that the Potomac Co., the predecessor of the Chesapeake and Ohio Canal Co., was organized in 1785. The object of this company was to so improve the channel of the Potomac River as to render it navigable as far as Cumberland.

Under the direction of Washington, who was its first president and who remained with it in that capacity until he resigned to accept the Presidency of the United States, the Potomac Co. started work at once and pursued it intermittently until 1820, by which time the public was thoroughly convinced that the Potomac River could not be made navigable by the expenditure of the limited amount of money then available.



EAST PORTAL HOFFMAN DRAINAGE TUNNEL



THE CONSOLIDATION COAL CO.'S NO. 7 MINE

finest white pine which abounded along this stream, and, at the first signs of a sustained rise, were floated to the stock pile of coal. The coal was loaded as rapidly as possible, the men working day and night. The crew then took charge of the boat, floated it to its destination—anywhere between Cumberland and Georgetown or Washington—and sold the boat and contents, returning to their homes on foot.

THE CONSTRUCTION OF THE CHESAPEAKE AND OHIO CANAL

By 1820, this traffic had assumed commercial importance and gradually increased until the completion of the Baltimore & Ohio R.R. to Cumberland in 1842, from which date it rapidly dropped off until after the completion of the Chesapeake and Ohio Canal to Cumberland in 1850; when it was abandoned altogether. While at its height as many as 40 boats have been known to leave in one day. Not only mine owners, but farmers, merchants, mechanics and men of every occupation participated in these boating ventures as a quick way of obtaining cash, which was then, as in all frontier communities, scarce.

This method of transportation, however, was at its best

The charter was then withdrawn from this company and granted to the Chesapeake & Ohio Canal Co., organized in 1828 to build a canal from Georgetown to Cumberland and thence to the Ohio River, with an auxiliary canal to Baltimore. The latter was never built but in 1850 the main canal, after great financial difficulties, was completed to Cumberland at a total cost of over \$11,000,000.

THE BUILDING OF THE BALTIMORE & OHIO R.R.

Just prior to the transfer of the charter of the old Potomac Co. to the Chesapeake & Ohio Canal Co., great interest was aroused by the experiments of Stephenson in England and Cooper in America with the steam railroad locomotive. Philip E. Thomas and George Brown, two citizens of Baltimore, were firm believers in the practicability of the railroad and called a meeting of the leading men of the city to discuss the advisability of building a railroad, instead of a canal, from Baltimore to Cumberland and Wheeling.

A plan for the organization of this road was drawn up and presented to the General Assembly of Maryland in February 1827 and an act of incorporation passed a few days later. The Baltimore and Ohio R.R. Co. was or-

ganized the same year and in July, 1828, work was commenced. The practicability of using the steam locomotive for haulage purposes was firmly established in 1831 and in Nov. 5, 1842, the road was completed to Cumberland and in operation.

THE FIRST COAL COMPANY INCORPORATED IN 1828

It is a significant fact in connection with the organization of these two great transportation companies, that the first regularly incorporated coal company of the Georges Creek Field was organized in 1828, the same year that ground was broken for the construction of both canal and railroad. The excellence of Georges Creek coal was appreciated at this early date and the assurance of some reliable means of transportation was all that was

Piedmont to connect with the Baltimore & Ohio R.R. at that point. This railroad was purchased in 1864 by the Cumberland & Pennsylvania R.R. Co., which had meanwhile acquired possession of the Mt. Savage Iron Co.'s road and extended it through Frostburg to Lonaconing. This was the first through railroad and remains to date the only railroad traversing the entire region.

In 1872, the Pennsylvania R.R. interests constructed a railroad to the Pennsylvania-Maryland state line at Ellerslie, and the Cumberland and Pennsylvania built a connecting link between this road and its line at Kreigbaum. Eight years later, the Georges Creek & Cumberland R.R., connecting with the Pennsylvania at Cumberland, was constructed from Cumberland to Lonaconing. No further additions were made to the shipping



MINING THE GEORGES CREEK "BIG VEIN" COAL. THERE ARE NO CLEAT AND BUTT FRACTURES

required to interest Eastern capital in the development of these coal deposits.

The first incorporated company was the Maryland Mining Co., operating at Eckhart. This was followed 10 years later by the Maryland and New York Mining Co., operating between Frostburg and Mount Savage. These companies were the pioneers in exploring and systematically examining the field but sad to say they were organized too far in advance of the arrival of adequate transportation facilities. They eked out a rather precarious existence up to the arrival of the Baltimore & Ohio R.R. in 1842, but finally failed and their property was acquired by others.

Both companies started to build a railroad to Cumberland, down the valleys of Jennings Run and Braddock's Run, respectively. The latter was started in 1845 and completed in 1846 by the Maryland Mining Co. The other road was not completed by the original corporation, but by the Mt. Savage Iron Co., its successor. Before the completion of these roads, all the coal was shipped over the Baltimore & Ohio R.R. after having been hauled by wagon to Cumberland.

THE ORIGINS OF THE CUMBERLAND & PENNSYLVANIA R.R.

The Georges Creek Coal & Iron Co., organized in 1835, built a tramroad from Lonaconing and connected with the Maryland Mining Co.'s railroad at Clarysville in 1847, and in 1853 built a railroad from Lonaconing to



CONCRETE OVERCAST IN CONSOLIDATION No. 11, BEFORE REMOVAL OF FORMS

facilities until 1912, when the Western Maryland R.R. acquired control of the Georges Creek and Cumberland R.R. and extended their trunk line across the northern end of the field.

Thus we have a record of the transportation facilities for over a century, from primitive wagon and flatboat until at present there are two competitive railroads with outlets over three competitive trunk lines and over the Chesapeake and Ohio Canal. These splendid shipping facilities, its proximity to tide water and its high grade of coal have given this region decided advantages over other coal fields for shipments into the world's fuel markets.

THE GRADUAL CONSOLIDATION OF THE GEORGES CREEK MINES

In addition to the coal companies already enumerated there were incorporated before 1850, the Frostburg Coal Co., the Allegany Mining Co., the Washington Coal Co., and the Borden Mining Co. Of these, only the latter is now in existence. A detailed record could be given of the other companies incorporated since that time, but with few exceptions, the financial history of one is the history of all. Many were organized prematurely, others were continually on the verge of financial ruin, almost all were merely existing.

No better illustration can be given of conditions than that shown to exist by the following circular issued in 1869 by a committee of the five principal mining com-

panies of the region, including the Consolidation Coal Co., which had been incorporated in 1860 and was at this time operating the properties originally owned by the Ocean Steam Coal Co., Frostburg Mining Co., Mount Savage Iron Co. and the Cumberland and Pennsylvania R.R.

To the stockholders of the companies mining Cumberland coal in Allegany County, Maryland.

An experience of 25 years has convinced many of the most practical and sagacious persons, whose interests have been identified with the development of the Cumberland coal mines, that those interests can be made reasonably remunerative only by a complete change in the system of management. The total product of 1708 tons in 1842 has been increased, by the legitimate demands of the trade, to 1,330,443 tons in 1868, with a prospect of 1,500,000 tons in 1869, and yet, of the immense capital which has been invested in Allegany County, in coal property, how large a proportion has been swept away, and of that now representing the mining interests how insignificant is the portion which, even occasionally, makes any return to the proprietors. Three reasons may be given to explain these unsatisfactory results. First, remoteness from our principal markets, with insufficiency and high cost of transportation thereto; Second, heavy expenses of multiplied administration, and Third, ruinous and, under existing circumstances, uncontrollable competition.

The first of these obstacles would inevitably subside, if not disappear under a systematic and unified apportionment of production to demand; the second and third would obviously vanish by the substitution of a single management, in the common interest, for the twenty-one separate organizations which, with their complicated and expensive machinery, now absorb the modicum of profit which is left to the owners of the mines.

Five of the largest companies having, with others, tried for years, but in vain, to remedy the evils above adverted to, by harmony of action, have at length determined to find, if practicable, a solution of the problem by uniting their properties under one organization, permanent and homogeneous. A suitable agent has been selected to investigate the relative areas and values of their respective coal lands, preliminary, it is hoped, to the adoption of an equitable basis of incorporation. These five companies are now moving in perfect accord toward that object, and have established a joint committee on consolidation. Within a month it is hoped that they will be prepared to proceed to the consideration of such a basis. To this end it is earnestly desired that as many companies now operating in the Cumberland coal region of Allegany County should unite in having their lands surveyed and appraised; or, if not that, that they will, at least, appoint a representative, or more than one and not more than three, to meet with the joint committee, and discuss with them the bearings of this scheme on their various interests. Stockholders are earnestly requested to press this important subject upon the consideration of their directors.

The five companies issuing this circular were the American Coal Co., the Borden Mining Co., the Consolidation Coal Co., the Cumberland Coal & Iron Co. and the Hampshire & Baltimore Coal Co.

THE FIRST ATTEMPT AT CONSOLIDATION FAILED

An agent was selected to report on the acreage and values of the various companies, and after six months' labor submitted a thorough report showing that there remained unworked in the region about 15,000 acres of the "Big Vein" seam alone. The report was unsatisfactory, however, to a number of the operators and the plan failed in attracting into the consolidation any other company than the Cumberland Coal & Iron Co.

The acquisition of the property of this company by the Consolidation Coal Co. gave the latter more than half the coal lands of the region and all the railroad facilities. These holdings were still further increased a few years later by the purchase of the property of the Allegany Coal Co. by the Consolidation Coal Co.

Although this proposed consolidation of all companies in the region failed, its effect on the Cumberland coal market was invaluable. The enlarged company intro-

duced better methods of mining and selling and fixed a high standard of excellence for its product, which has always been maintained. Being on a sound financial footing, it was in position to undertake improvements impossible of execution by any of its smaller component companies. It was the pioneer company of the region to install steam-driven fans for ventilation, and to use mine-haulage locomotives.

It has always been in advance of other companies in the region in conservation of its property and has been making strong efforts toward the ultimate extraction of every available ton of coal. It is the only company in the region that has solved the problem of satisfactorily and economically draining those mines below water level, thus increasing the ultimate recovery from the region and lengthening its life and prosperity. It has, since its inception, paid regular dividends to its stockholders, something unheard of before in this region, and is a fair representative of that class of consolidations which are beneficial alike to competitors, employees and the consumer.

Numerous companies have been incorporated since the organization of the Consolidation Coal Co. Those which were organized along conservative lines with good financial backing and good management were successful, while others, over-capitalized and mismanaged, have had a rather checkered career.

DOUBLE-ENTRY SYSTEM INTRODUCED ABOUT 1850

The early development was almost exclusively in the Pittsburgh or Georges Creek "Big Vein" Seam and the mining methods followed at first were of the crudest. An opening was made into the coal on the outcrop, driven wide and poorly timbered for a hundred feet or so, by which time it generally caved in, then another opening was made and the performance repeated.

This method was gradually modified until about 1840, at which date the general mode of procedure seemed to be to drive a single heading as far as possible without any artificial ventilation. Rudimentary rooms, seldom over 50 ft. long but about 20 ft. wide, were then driven to the right and left with but very little coal remaining between them. This operation was continued as near the outcrop as the condition of the seam and roof would permit and the opening then allowed to fall in.

Mines developed in 1850 show that recognition was being given to the need of better ventilation; in some few instances double entries were driven with furnaces as the ventilating appliance. There was no regularity, however, in regard to crosscuts or break throughs, or to the spacing of rooms. Rooms were driven of irregular width, crooked and running into each other at all sorts of angles, with no provision for the ultimate extraction of all the coal.

WILLIAM CULLEN BRYANT, STYGIAN RIVULETS, ETC.

The following description of a trip through a Georges Creek mine, in 1860, by William Cullen Bryant, the famous poet, will no doubt be interesting, and will give some idea of the mining methods of that period:

Our party made a visit to a coal mine some three miles distant from Mt. Savage. From one of the black entrances flowed a lively little stream with yellow waters, into which I dipped my finger to ascertain their flavor. They were acidulous and astringent, holding in solution both alum and copperas. Leaving the Stygian rivulet we came to another entrance, out of which a train of loaded trucks was passing, every one of which was attended by a miner blackened from

head to foot with the dust of his task, and wearing in the front a small crooked lamp to light his way. As they emerged from the darkness they looked like sooty demons of the mine with flaming horns coming from the womb of the mountain.

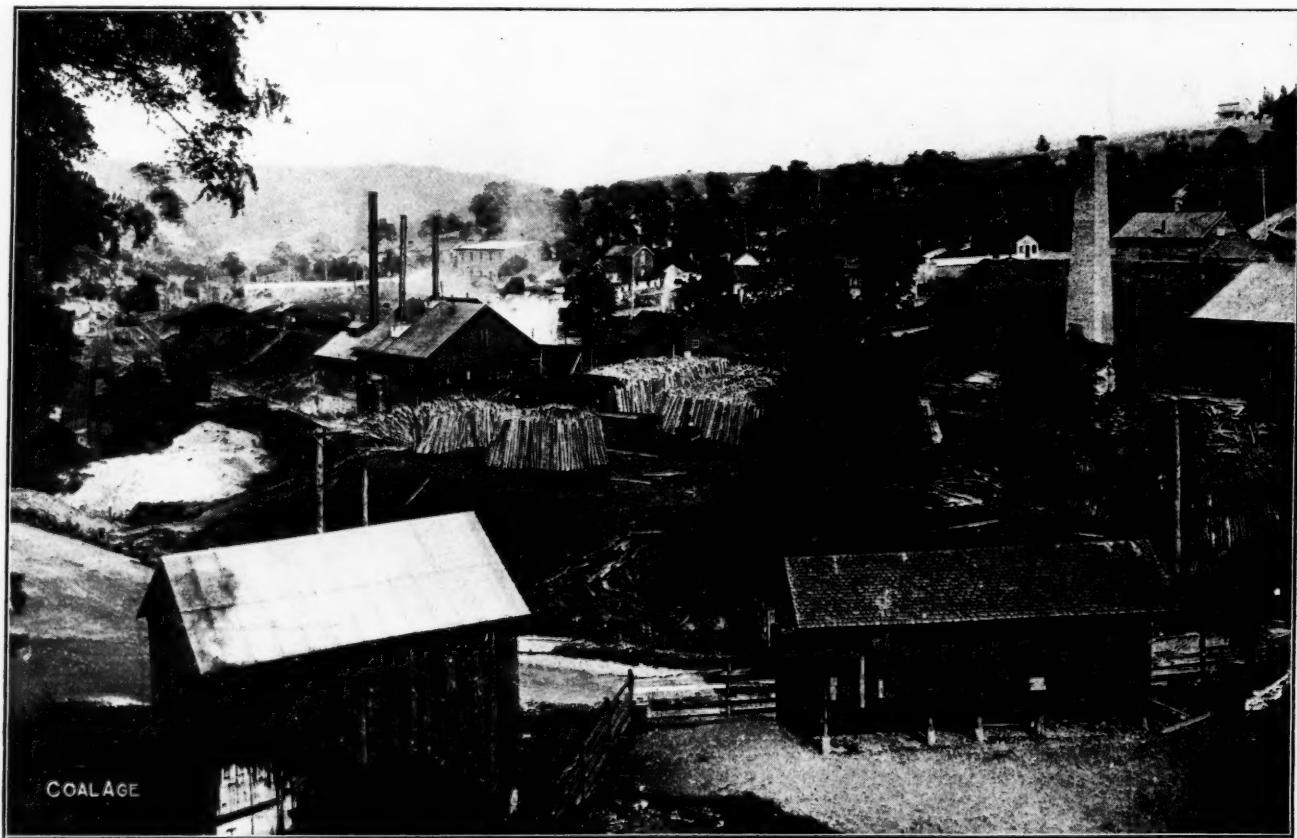
We now entered, each carrying a lantern, attended by a guide. The vein of coal is from 8 to 10 ft. thick, and the passage is of that height, with a roof of glistening slate, propped in some places by wooden posts. Here and there, on each side of the passage, yawned chambers cut in the veins of coal, and extending beyond the reach of the eye in the faint light of our lanterns. At length we heard the sound of sledges, and proceeding for some distance farther came to the end of the passage, where the workmen, each with a lamp in his cap, were driving wedges into the cracks and fissures of the coal to separate it from the roof and walls. We saw several large blocks detached in this manner, the workmen jumping aside when they fell, and then we retraced our steps.

Before returning to the entrance, however, our guides took us into a branch of the main passage, in which, after pro-

headings were paralleled by air courses. No mechanical devices had as yet been installed for ventilating purposes. The furnace was, however, coming into more extensive use.

Slope-haulage engines had been in use since 1845, but this decade—1870 to 1880—witnessed the installation of steam locomotives for mine haulage and also the first power-driven fan for mine ventilation. This was an exceptionally important step forward and one that was soon generally adopted throughout the region.

The mine workings show a regular and decided improvement between 1880 and 1890. At the close of this period, all rooms were being driven on points, they were more regularly spaced, were driven narrower and the pillars between the rooms wider than before. Efforts



THE OLDEST MINE IN OPERATION IN THE GEORGES CREEK REGION. IT WAS OPENED IN 1842.

ceeding a little way, we heard a roar as of flames, and then saw a fierce light before us. A furnace appeared, in which a fierce fire was blazing; the blackened workmen were stirring and feeding it, and a strong current of air rushing by us went with the flames up the shaft, which reached above to the surface of the ground. This, we are told, was a contrivance to ventilate the mine. All the foul air and all the firedamp and other noxious gases are drawn up and carried off from the passages and chambers by this method. On our way back to the entrance we perceived that the veins lay at just such an inclination as allowed the workmen to roll the loaded trucks by hand along an easy descent to the mouth, as I hear is the case with all the mines.

EVEN IN 1870 ALIGNMENT SIGHTS WERE SET

Workings of 1870 show in some places, rooms regularly spaced and driven on points. Some portions of workings were still, however, driven on the old method and those rooms that were spaced at regular intervals were too wide and the pillars too narrow. The need of ventilation was now more fully realized and almost all

were now being made to secure all the coal by pillarizing. The results were not as gratifying as at present, but were far better than anything attempted before.

The next decade marked the installation of mining machines, compressed-air motors for inside haulage and also the first successful development of the smaller seams of coal. Previous to 1890, mining had been confined almost exclusively to the Pittsburgh or "Big Vein" seam, but since that date the high quality of the coals of the smaller seams has been realized and at present there are more mines working in these beds than in the "Big Vein."

In 1900, about 75 per cent. of the coal was being recovered, but this, by careful management and a more thorough knowledge of the action of the overlying strata, has been increased until at present a record of 95, 96 or even 97 per cent. ultimate recovery in some of the mines is by no means uncommon.

Electricity in Coal Mining

BY DAVID R. SHEARER*

SYNOPSIS—This is the fifth article in the series on this subject. The selection of prime movers—reciprocating engines, steam turbines and waterwheels—is taken up in relation with the first cost and operating expenses of the plant.

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Perhaps the most important part of any plant used for mine operation is the prime mover or source of power by which the electric generating equipment is driven. The chief reason for this is the fact that this part of the equipment varies more widely in first cost, operating expense and upkeep than any other part of the entire plant. In considering the generating equipment, we find that the efficiencies of all standard machines are high, ranging from 85 to 90 per cent. of the power expended on the generator shaft. Moreover, if properly installed, a generator is not liable to rapid depreciation or inherent accidents, nor does the efficiency diminish with the age of the machine.

If we examine the steam engine, in the light of generator operating characteristics, we note that it is a very inefficient machine and that this inefficiency increases rapidly with the age of the engine. We cannot, however, consider the engine alone from a practical standpoint in determining the prime-mover efficiency of a steam power plant for the very evident reason that the boiler or boilers play an important part in regard to the operation of the engine.

Engines are classified into several distinct types, each of which may have some favorable points, offsetting which are certain inimical features applicable to each type of machine. The simple slide-valve engine is perhaps the most common, it being cheaper in first cost but far more inefficient than later and more costly types.

Even the slide-valve engine is found in two varieties, the high-speed or automatic-cutoff engine, which is perhaps the more modern type, and the slow-speed or throttling engine. This latter form is almost obsolete, owing to its lack of regulation and its large consumption of steam. For small installations, say 100 hp., the high-speed automatic is very satisfactory, but when it becomes necessary to install a larger unit, it is usually advisable to use a more efficient type of engine.

In the larger types we have the corliss, condensing and compound. The chief value of the corliss engine lies in the type of valve-gear used. In this type the valves for inlet and exhaust may be adjusted separately and individually so that the point of admission and release may be set at the most economical operating points for a given set of conditions, while in the slide-valve engine the same valve unit is used for both inlet and exhaust and therefore is not subject to adjustments.

Within recent years, engines of the four-valve type have been brought out, differing to some extent from the corliss system. High economy is claimed for some of these machines, which are usually of the non-releasing type. Although some simple corliss engines are in use, it is usual to find them run condensing, as by so doing we

secure some 10 or 12 lb. more working pressure on the piston heads.

A step further in this direction leads us to the compound condensing corliss engine, in which type there are two cylinders. The steam is admitted first to the high-pressure cylinder and the exhaust from this cylinder used in the large low-pressure cylinder, after which it is discharged to the condenser.

With an engine of this last named type we may secure an efficiency approximately three times as great as with the simple slide-valve throttling engine. Another point in favor of the compound condensing unit is that the efficiency of this type of machine holds up well throughout the life of the plant.

THE STEAM TURBINE

Another type of prime mover which has come into prominence within the last 10 years is the steam turbine, either used alone or in conjunction with a corliss engine. The turbine is noted for its high speed and for its ability to utilize steam containing a high degree of superheat, the use of which cuts down condensation losses and adds to the overall efficiency. Owing to the high speed, it is usual to find the turbine used to drive an alternating-current generator, the direct-current generator not being well adapted to such high speed on account of commutator troubles. The efficiency of the ordinary steam turbine, when used alone, is perhaps not quite so high as that of the compound corliss condensing engine, but when designed for low pressure and used on the exhaust from a corliss machine, a marked increase in economy is possible, considering both engine and turbine as a single unit.

So many factors enter into the proper selection and installation of steam engines and their accessories that each individual case must be worked out separately after all the factors governing the plant operation have been determined. The probable life of the plant must be assumed from past experience with similar installations and the cost of several different types of equipment must be estimated.

After this the economy and cost of operation of the differing types must be determined. With this data clearly expressed, a balance must be worked out between the efficiency desired and the initial cost. No detail should be left out that would go toward adding to the overall efficiency. Such, for instance, as properly covering the steam pipes, the use of superheaters and economizers, the installation of feed-water heaters and the proper utilization of as much of the heat produced by the burning coal as is possible.

BOILER EFFICIENCY IS IMPORTANT

The efficiency of the steam plant depends largely on the boiler also, since we may use a good engine on a poor boiler or vice versa, and secure very unfavorable results. The number of types of boilers and boiler accessories is almost unlimited and it is really difficult to determine just what type to use under certain conditions. Formerly practically all boilers of any size were placed in a brick setting, but within recent years, several manufac-

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turers have brought out types of boilers which are self-contained and require little or no brickwork. These boilers have the advantage in that there are no cracks in the setting or furnace by means of which air can leak through and thus decrease combustion efficiency.

As a usual thing, a feed-water heater should be used with a boiler of any size, so that the water may be pumped to the steam generator at as high a temperature as possible, thus securing a gain in efficiency and preventing damage to the boiler plates by the sudden admission of cold water. As the gases usually leave the boiler tubes at a comparatively high temperature, a considerable saving may be effected by passing these flue gases through an economizer before admission to the stack. The draft in the furnace may depend either on the stack or on a system of fans or blowers. Each of these methods has certain advantages and must be determined upon during the design of the boiler-plant layout.

Two methods of firing boilers are in common use, hand firing and mechanical stoking. For small plants where a careful fireman is employed, the hand method is very efficient, but larger plants and those in which it is difficult to secure competent firemen are largely employing mechanical means to force coal into the furnaces.

Two factors of saving are introduced by the use of mechanical stokers; a saving in labor cost if the plant be of some size and the obviation of the personal element in methods of stoking. The mechanical stoker, if properly installed, fires continuously and uniformly, while it is well known that in hand-fired plants, one man may use 25 per cent. more coal than another without increasing the steam output.

Another saving accrues from the fact that when using a mechanical stoker it is rarely necessary to open the furnace doors, whereas with hand firing, this is an absolute necessity and at every time of fuel replenishment large quantities of cold air are admitted to the furnace, thus, to some extent, cooling the boiler tubes.

A fact worthy of the closest attention is the saving made possible by the use of adequate instruments, for the proper determination of the operating characteristics of both boilers and engines when properly manipulated by a fireman or engineer, having in mind the good of his employer and the necessity for economical operation. Among such instruments may be mentioned draft gages, steam-flow meters, water meters, coal-weighing apparatus, carbon-dioxide recorders, feed-water thermometers, besides the regular equipment of any steam plant, such as steam and vacuum gages and other necessities. If these instruments are properly used, and the engineer is forced to keep a systematic record of the operation of his plant, great gains and economy are possible.

Some may say: "What is the necessity of so closely guarding economy in the power plant of a mining operation where coal is plentiful?" The answer to this point, which is often raised, is that the coal which is burned in the boiler to produce power for mining operations is worth just as much as the coal that is placed on the car for shipment, and if it is worth while to mine the coal, in order to ship it, it is certainly worth while to effect any saving possible by reasonable means in the fuel consumption of the plant. Many mine owners forget that although the first cost of an efficient plant is higher than that of one inferior, the saving from this efficient operation extends over the entire life of the mine and may

reach such an amount as would pay for the plant several times over. Another point in favor of a more expensive plant than is usually installed is that such a plant is less liable to breakdown and costly upkeep.

WATER POWER IS CHEAP AND DEPENDABLE

A power which was rarely used in mine work until recently, but which is coming to the front on account of its continuity of service and cheapness, is water. At the present time, we find many mines served by water power solely and this frequently over long transmission lines. It sometimes happens that a water-power plant can be installed more cheaply than a steam plant of the same size, although this is rarely the case. In any event, however, the operating cost of the water-power plant, if within a reasonable distance from the mine, will be considerably less than that of a steam plant.

Many types of waterwheels are in use, each best fitted for a particular condition to be met and many different arrangements of connection between a waterwheel and a generator are in use. The most common type of hydro-electric plant consists of a reaction turbine waterwheel, direct connected or geared to an alternating-current generator. We frequently find, however, a generator belted to a jack shaft, operated by bevel gears from the wheel shaft. The use of direct-current generators in a water-power plant is not at all common, owing to the fact that the power plant is usually located some distance from the mine operation, thus necessitating a high-voltage transmission line to cut down transmission losses and decrease the size of wire necessary.

In location, design and installation of a hydro-electric plant for use in operating a mine, we are confronted by the same problems which have to be met in the steam plant. That is, we must consider all the peculiarities of the power site and of the conditions to be met in the operation of the plant. Many factors must be considered in the initial design and much preliminary calculation done before a definite layout can be determined.

Many mine owners have recently found that several mines may be adequately served from one water-power plant with a marked saving to all concerned. In some instances, when a good water-power site can be secured, it is advisable for the mine owners to form a stock company among themselves and erect such a plant, from which each purchases sufficient power for his own use.

Many mines can be served from one plant more efficiently than one mine, because the surges or load peaks come at different times on the different plants, thus smoothing out the power-plant load. Again, it takes very little more labor to operate a large hydro-electric plant serving several mines than a plant operating only one. When such an arrangement is possible, the owners of the plant can employ more competent electricians and furnish better service throughout.

It is possible also to use one crew of repair men and trouble shooters for all the mines, thus obviating the necessity of each mine running its own repair shop and employing a crew of men which are idle a large part of their time.

Great possibilities are open to mine owners along these lines as the developments during the next few years will no doubt show. But those reaping the greatest gains will be those who soonest put into effect systems of this kind.

Effect of Panama Canal on World's Coal Markets--II

BY F. R. WADLEIGH*

SYNOPSIS—The second installment of this article which is confined essentially to a discussion of the merits of our different foreign competitors. Great Britain is the power to be reckoned with in the world's coal trade, but there are other countries forging ahead rapidly which cannot be ignored. The use of fuel oil threatens to be a powerful factor in the situation, particularly in the Pacific Coast markets.

West Virginia's competitors in the Pacific markets are put in two classes by Mr. MacCorkle.

First—Coals from Australia, Great Britain, Japan, South America, China, Vancouver Island, South Africa.

Second—Domestic coals from Virginia, Pennsylvania, western Maryland, Alabama.

OUR WELSH RIVALS

We may as well admit, for it is a fact, that the best Welsh coals are the best coals in the world in heating value, and general excellence for steam making, especially for ships use; but all of the Welsh coals are not the best and the New River-Pocahontas fuels, properly prepared, can compete on even terms with any but the best.

The author does not seem to realize, however, that there are other British coals beside Welsh, with which we must reckon, the latter being taken as the sole example of the British product. The best Northumberland coals are little inferior to the Welsh grades shipped to South America while their cost at tidewater today is considerably lower (\$3.25 per long ton) and the freights to South American ports are about the same. The best Northumberland coals (Davidsons, Cowpen, Bothal) have the following analysis from actual shipments:

Moisture	1.40
Volatile	32.80
Fixed carbon	62.90
Ash	2.90
Sulphur	0.83
B.t.u.	14,601.00

This coal is quite hard, stands handling well and is well prepared.

The following are quotations on Welsh coals:

	Nov. 7, 1913	Mar. 27, 1914
Best Welsh coals.....	\$4.80@4.92	\$4.35
Best drys	4.32@4.56	4.14
Best Monmouthshire.....	3.92@4.14	4.09

Judging from the above, the statement that the Welsh coals are bound to increase in price does not seem to be true. Neither the best Admiralty, nor the dry coals (very low volatile, 10 @ 11 per cent) go to South America, except some Admiralty for naval use. (The Argentine navy has just bought 150,000 tons best Admiralty). The coals that do go are Cardiff seconds and smalls, Monmouthshire bests and seconds, on which prices are quoted today as follows:

Cadiff seconds	\$4.20
Cadiff smalls	2.60
Monmouthshire bests	4.09
Monmouthshire seconds	3.90

Welsh Coals at Panama—Our article asks if there can

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be competition, at such prices, with New River-Pocahontas coals at Panama. Not even the English operators themselves ever thought of such competition.

Other Markets besides Panama—Charter rates quoted are as follows:

	Nov. 13, 1913	Apr. 5, 1914
From Cardiff to—		
Rio Janeiro	\$3.71	\$3.16
Buenos Aires	3.53	3.28
Santos	3.89	3.28

Quoting further, "One charter was made last week for the transportation of 5500 tons from Hampton Roads to Rio Janeiro at 16s. 6d. (\$4.01). On the basis of this last shipment, New River and Pocahontas coals were delivered in Rio Janeiro at a cost of \$7.01, as compared with \$8.63 as the cost of the best Welsh steam coals. These ports are on the Atlantic but roughly exhibit the opportunity for the sale of coal on the Pacific coasts after the Canal is constructed."

Let us take Rio, at present (Apr. 1) quotations, and compare costs:

	Coal	Freight	Total
New River coal.....	\$2.85	\$3.58*	\$6.43
Welsh coal†	4.09	3.16	7.25

*Cargo of 5131 tons. †Best Monmouthshire.

As already noted, the best Admiralty coal is not shipped for commercial use to South America. Moreover, the Atlantic ports do not "exhibit the opportunities for the sale of coal on the opposing Pacific ports." On the Atlantic side we have only the competition of British coals to meet, while on the Pacific, we have as competitors, not only the British coals, but the Australian, Japanese, native coals and fuel oil, the latter now being used in large and increasing quantities in both Peru and Chile.

Again, if we have this advantage of 78c. on the east coast in our favor, why have we not been able to take these markets away from Great Britain? Why should we get more west coast trade, after the Canal is opened, when we have not been able to get the east coast with everything in our favor? The distance from Hampton Roads to Rio and Buenos Aires is less than the distance from Cardiff to the same ports. Brazil is now readily accessible to us, yet we have a smaller percentage of her total trade than we have of Peru's.

The article then asks if it is reasonable to suppose that West Virginia thrift and enterprise will allow Welsh coals to compete in these markets at the difference in price. The English coal and steamship people are just as thrifty and enterprising as are the West Virginians, besides which they are strongly entrenched in the markets and know much more about selling conditions and the exporting of coal. They are also interested in steamship lines, have their own selling agencies, coaling stations and docks, and own many of the largest industrial plants, mines and railroads. Take the Argentine, for instance; out of a total of 32,854 kilometers of railways, 22,908 are British owned.

THE AUSTRALIAN COMPETITION

Comparing the quality of the Australian coals with those of West Virginia, we find:

	Moisture	Volatile	Fixed Carbon	Ash	Sulphur
Australian	1.92	3.509	54.08	2.91	0.541
New River	0.983	20.805	74.983	3.229	0.621

Using one cord of seasoned white oak as the unit of measurement, the U. S. "Navy" Department has determined the following equivalents:

	Lb.
New River, average of 7 tests	1676
Australia, average of 10 tests	2225
1000 lb. of New River coal has the same fuel value as 1327 lb. of Australian coal.	

The above analysis of Australian coal is wrong; the sum of the constituents (excluding sulphur, always separately determined) is 62.419 instead of 100, and the ash is entirely too low. Typical analyses of New South Wales bituminous, the coal exported to South America are given herewith.

The greater part of the Australian coals suitable for export come from two districts in New South Wales. That from the New Castle district varies considerably in quality, the best of it being similar to Pittsburgh coal and averaging about 33 per cent. volatile, with 7 to 12 per cent. ash. From the Southern district, the coals resemble Pocahontas more, although higher in ash and volatile and slightly harder, these being the best Australian coals, especially for steamship use.

At any rate, one analysis does not represent Australian fuels; there are many different kinds of coals in that country, as the following typical analyses will show:

	Mt. Aberdare	Kembla	Sydney Harbor	Southern Field ¹	New castle ²
Moisture	1.32	1.37	0.67	0.71	2.01
Volatile	40.47	25.14	19.76	23.65	36.01
Fixed carbon	52.58	62.29	71.67	63.98	58.27
Ash	5.63	11.20	7.90	11.66	8.71
Sulphur	1.23	0.43	0.44	0.47	0.47
B.t.u. dry				13,200	13,300

¹Average of 35 samples. ²Average of 75 samples.

The analysis given of New River coal cannot be maintained in actual shipment, the ash and sulphur both being too low. A typical analysis (actual) of the best New River coal, as shipped, is as follows: Moisture, 1.107; volatile, 20.50; fixed carbon, 73.37; ash 4.96; sulphur, 0.828; B.t.u., 15,053, while the average of 27 cargoes shipped to the Panama Canal was: Ash, 5.395; B.t.u. dry coal, 14,881.

The oak wood equivalent tests are hardly worth considering. In the first place, it was the United States War Department, not the Navy, that made these tests; the Navy would hardly be guilty of such "tests."

This method of determining the comparative values of coals was started 20 or 25 years ago, to show the values of coals for heating purposes at the various army posts and was carried on until only a few years ago. The samples of coal used were only 1000 lb. in weight and were, in some cases, at least, selected, as I know personally, from the best coal in the mines, while the method was inaccurate and has long been a subject of ridicule, even by the Government officials.

There has never been any question as to the inferiority of Australian coals to New River and Pocahontas in heating values, but the former are hard and lumpy, make steam quickly and are excellent locomotive fuels; their price on the west coast has been such that they could compete with the better-grade coals.

With the opening of the Panama Canal, this difference in value will be overcome and the Australian coals largely eliminated from the west coast markets.

"JAPANESE AS RIVALS"

Although in 1913, there were 3,800,000 tons of Japanese coal exported, it is unlikely that there will be any

increase for the next year or two as the home consumption is steadily increasing and the price of coal has advanced 74c. per ton for 1914. The total output of Japan was 19,000,000 tons in 1912 and is increasing every year. Practically all of the islands are underlaid with coal and it is estimated that there are 7,002,200,000 tons available.

It is stated in the article under review that Japan's coal seams are usually small and the fuel is often a "dirty coal of steaming grade," whatever that may mean, and high in ash and sulphur; also that in the best fields the coal is mined by shafts and that all the mines are wet.

The principal coal fields of Japan are: Chikuho (most important), Taka-Shima, Hokkaido, Miike.

The Chikuho seams vary from 3 to 8 ft. in thickness. In the Taka-Shima district, there are six seams varying from 3 to 17 ft. in thickness. About 150 seams ranging from 1 to 60 ft. in thickness, occur in the Hokkaido district. The seams in the Miike field are 3 to 8 ft. thick normal, though occasionally 25 ft. thick.

Typical analysis of coals from the different fields is as follows:

	Chikuho	Taka-Shima	Hokkaido ¹	Miike
Moisture	4.21	1.16	2.74	0.66
Volatile	42.92	38.83	41.05	41.74
Fixed carbon	45.71	54.43	50.65	48.24
Ash	7.33	5.58	5.56	9.36
Sulphur	0.68	0.82	0.40	3.64
B.t.u. as received	12,965	12,979	13,274	13,427

¹Analysis of the main seam (24 ft. thick) in the Yupo district.

The article states: "The Japanese coal will compete in the Far East, but not with ours or that of Australia in markets to which Japan has less convenient access." As a matter of fact, 80,000 tons of Japanese coal was brought into San Francisco in 1913, and 30,000 tons were bought by the Chilean Railways in the same year.

VANCOUVER ISLAND'S COALS

As regards western Canadian coals the article states: "The question of the ability of West Virginia to compete with the Vancouver coal is one demanding careful consideration." This followed an analysis made by the U. S. Government "of coals shipped under the trade name of Comox, Nanaimo and Wellington" which is as follows:

Moisture	1.600
Volatile	30.251
Fixed carbon	56.688
Ash	11.461
Sulphur	0.512

There is also another comparison given of heating value, based on the obsolete and inaccurate seasoned white oak standard, which shows that New River coal is 39 per cent. better than the Vancouver product. This analysis is fairly representative of the Comox coal, but there are three other seams, the Wellington, Douglas and New Castle. Recent analyses of these coals are as follows:

	Wellington	New Castle	Douglas	Comox
Moisture	1.16	1.9	1.54	1.0
Volatile	40.47	39.4	33.30	29.0
Fixed carbon	50.04	45.7	56.23	57.2
Ash	7.89	11.7	8.44	11.9
Sulphur	0.53	1.3	0.49	0.9
B.t.u.	13,410	12,470	13,446	13,010

The statement that New River coal is 39 per cent. better than average Vancouver fuel is absurd, as following comparison will show:

	B.t.u.
New River	15,006 = 100
Wellington	13,410 = 89
New Castle	12,470 = 83
Douglas	13,446 = 89
Comox	13,010 = 86

It is further stated: "The price of Vancouver coal at the loading port, f.o.b., was \$3 to \$4.50." Which figure should be taken? There is rather a wide difference. Then: "The sailing distance from San Francisco is about 950 miles" while according to Philip's tables, it is 820 miles. As to the ultimate cost at San Francisco, the article says: "I think we can safely estimate the charter rates at about \$1.50 per ton; this makes the *cost* of Vancouver coals alongside at San Francisco not less than \$6 per ton." It is clear that this is the *price* asked, not the *cost*.

Then the statement is made that New River-Pocahontas coals can be delivered at San Francisco at the same price, *omitting tolls*. From present indications, tolls must be figured in, which would add about 50c. per ton to the cost of coal. But even now Hampton Roads coals can be delivered alongside at San Francisco for \$6.24, based on a \$2.85 f.o.b. price, and a freighting bid to the U. S. Navy of \$3.39 for a cargo to be shipped in May, 1914.

The statements as to costs and heating value made by Mr. MacCorkle are said to apply to the whole western coast of the United States and to give the West Virginia coals "an absolute determinable advantage" over the Vancouver fuels at San Francisco, Mexico, Central and South America.

This whole question of the coal competition along the west coast, north of Mexico, cannot be settled or determined until the matter of ocean freight rates and canal tolls is known; it is also more than probable that there will be a readjustment of prices on the Pacific Coast coals. We believe that our strongest competitors for the North Pacific Coast trade, leaving fuel oil out, will be the British Columbia coals.

In 1912, there were 858,981 tons of these fuels shipped to the United States, about 38 per cent. of the total output.

SOUTH AMERICAN COALS

The statement is made: "At times reports have come of good coal in South America. Investigation has never proved the report true." Mr. MacCorkle is evidently not familiar with all of the reports on South American coals as investigations have shown that there *are* quite large deposits of good coal there.

There is excellent coal within 100 miles of the Pacific and a railroad is almost completed from the coal deposits to a port, 410 miles south of Panama. This coal has the following analysis (outcrop samples taken by the writer):

	No. 1	No. 2
Volatile	23.21	23.17
Fixed carbon.....	68.05	70.58
Ash	7.66	5.38
B.t.u.	14,282	14,680

The extent of this field is not accurately known, but it covers a large territory in the Cauca Valley, Colombia, estimated at 10,000 square kilometres.

There are also good coals in Venezuela, as the following analysis of outcrop samples, taken by the writer, show:

	As Received	Dry
Moisture	1.45	46.94
Volatile	46.26	50.86
Fixed carbon	50.12	2.20
Ash	2.17	0.83
Sulphur	0.82	14,542
B.t.u.	13,403	14,756

This coal is on the coast and transportation facilities could easily be provided. The Chilean coal is not "all dirty" nor does it "steam badly," nor "deteriorate rapidly." The best of it is a fair steam coal, quite equal to some of the West Virginia fuels. Under certain conditions, it has excelled Pocahontas coal as a locomotive fuel. It shows the following analysis, mine samples:

	Lota	Coronel	Curanilahue
Moisture	4.09	3.61	3.71
Volatile	37.56	34.17	35.70
Fixed carbon	55.64	55.74	55.79
Ash	2.67	6.46	4.79
Sulphur	0.20	0.28	0.64
B.t.u. as received.....	13,835	13,122	13,403

The total output of the Chilean mines in 1911 was 1,277,000 tons, the price at the mines being from \$1.20 to \$1.40 per ton.

There are also large deposits of coal in Peru, both semi-anthracite and bituminous, some of which will be available for shipment in the next two years.

China and South Africa—As Mr. MacCorkle says, there are large areas of coal in China, some of it, at least, of good quality, but one need fear no competition from this coal for some time to come.

Alaska coals—The possible competition of Alaska coals is dismissed in a few words as being of small importance, which is probably correct. Alaska mining costs and the transportation by water will be prohibitive for some time to come, apart from the question of quality.

(To be continued in issue of July 11)



Alabama Mines Are Active

According to the figures of E. W. Parker, of the U. S. Geological Survey, in co-operation with the Geological Survey of Alabama, the production of coal in that state in 1913 was 17,678,522 short tons, valued at the mines at \$23,083,724.

The increase in coal production in Alabama in 1913 compared with that of 1912 was 1,577,922 short tons in quantity, and \$2,254,272 in value.

Labor conditions were much better in 1913 than in either 1912 or 1911, and ear shortage was less acute in 1913 than in recent years, some of the large coal-carrying roads having added materially to their facilities for handling the output. The increased tonnage went principally to points outside the state.

The relations between operators and mine workers were generally harmonious and increased wages were put into force in February. Earnings by miners and mine laborers in 1913 are said to have been higher than ever before in the history of coal mining in Alabama, and improved sanitary and living conditions put into effect by many companies added to the general betterment.

The number of men employed was 24,552 as against 22,613 in 1912. The total time lost by strikes in 1913 was 27,041 days, 1048 men being idle for an average of 26 days. There were 124 men killed in the coal-mining operations of Alabama in 1913.



Coal is being mined in large areas in Servia and in the Balkan basin of Bulgaria, where many seams of friable coal are found.

The Lignite Briquetting Plant at Minot, N. D.

By G. J. MASHEK*

SYNOPSIS—With greater supplies of lignite than all other varieties of coal combined, the time is fast approaching when these low-grade fuels will be briquetted and used. In certain instances, including the one here described, this has already proved a commercial success. The plant at Minot differs from customary practice in that the lignite is carbonized in coke ovens before being briquetted.

The Northern Briquetting Co., of Minot, N. D., has erected a small commercial carbonized lignite briquetting plant. It is rated at from 8 to 10 tons an hour and has been operated up to $11\frac{1}{4}$ tons per hour, making about $2\frac{1}{4}$ -oz. over-stuffed, pillow-shape briquettes from car-

cite, the price of which, in the Western part of the United States is extremely high. Lignite, however, is available at as low a price as 90c. a ton at the mines.

Many attempts have been made to briquette lignite in its natural state, but all of these have been failures. Raw lignite briquetted is only benefited by the amount of binder introduced, which prevents the tendency to air-slack to some extent. Little better results are obtained during combustion, for the reason that the lignite usually crumbles to dust and much more must be used for steam purposes on account of its low calorific value. Some improvements have been made in the construction of fire-boxes, special grates, etc., so that somewhat better results are obtained with raw lignite under boilers than for

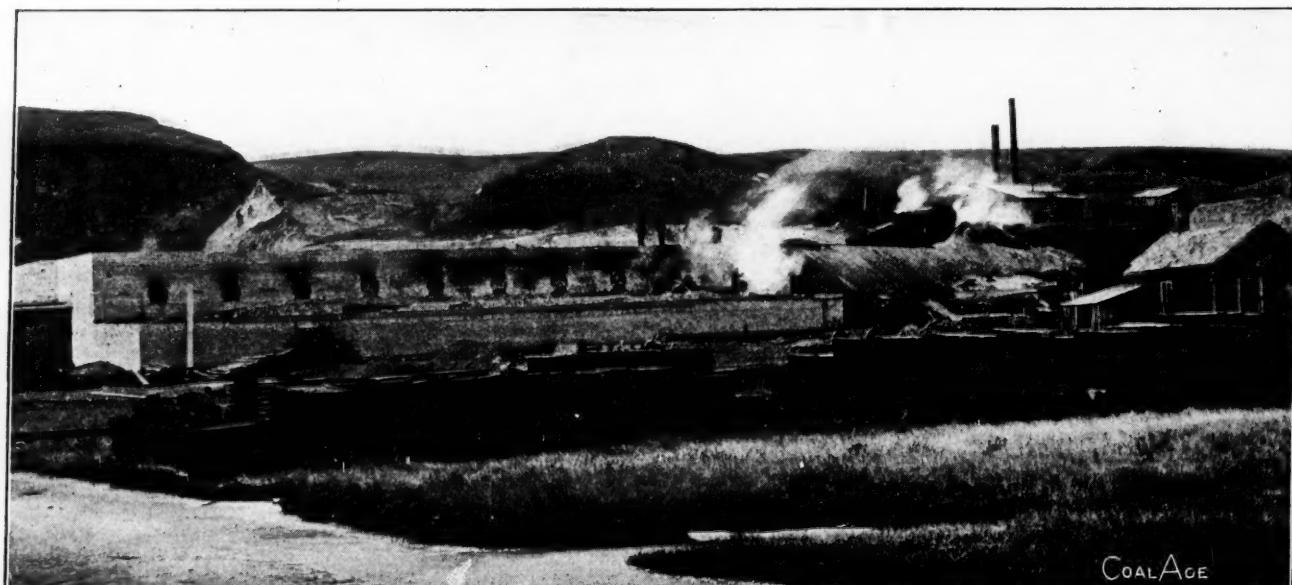


FIG. 1. BEEHIVE CARBONIZING RETORTS WHERE THE LIGNITE IS TREATED BEFORE BRIQUETTING

bonized lignite. This is the first commercial lignite briquetting plant erected in the United States, converting lignite to fuel practically equal to anthracite coal in heating value and nearly smokeless.

AMERICAN VS. EUROPEAN PRACTICE

It might perhaps be proper to mention that while the briquetting of lignite or brown coals in Europe is a large industry, these fuels are considerably different from those of the United States with the possible exception of certain Texas lignites. There are greater deposits of lignite in the Western states than of all the other coal combined, in this country. The main drawback to the development and use of this fuel has been the high percentage of moisture contained and also its air-slacking qualities, which makes it impossible to store it for any length of time.

Thus in spite of all these large deposits, most of the coal consumed in the states having the greatest lignite deposits has been semibituminous, bituminous or anthra-

merly. However, for domestic use no improvement of any consequence has been made.

A number of European briquette plants have been imported, which, while very successful in briquetting the foreign product, have, as already noted, proved failures when operating on American lignites and under conditions existing in this country. The United States Bureau of Mines, some years ago, made extensive experiments and tests with European machinery to briquette lignite without the use of binders. There have been produced some fairly hard briquettes from certain deposits of young lignites that contain considerable quantity of natural pitch. But these deposits are rather rare. The briquettes made by this process (under a pressure of approximately 20,000 lb. per sq.in.) have withstood the weather fairly well, but when thrown into the furnace they really gave little, if any, better results than lignite in its natural state, clearly demonstrating that briquetting lignite without the use of binders is out of question as a commercial undertaking in the United States.

*President, Mashek Engineering Co., New York.

DEVELOPMENT OF THE CARBONIZING PROCESS

The manner of briquetting lignite by carbonizing the raw product first has been a success for upwards of ten years. But no material progress was made in this industry until the fall of 1909 when the state of North Dakota made an appropriation to the State University for the purpose of carrying on further experiments and tests in this direction. The work was undertaken by Prof. E. J. Babcock, Dean of the School of Mines, and the researches, tests, etc., made are of great value to the industry, especially the possibilities which were discovered of producing gas for industrial purposes from lignite.

"Briquettes," is an important addition to the knowledge on this subject.

The selection of a suitable carbonizer in the installation of a lignite-briquetting plant is an important item. The type of apparatus is dependent on whether it is advisable and profitable to save the gas for use in gas engines or firing boilers. If there is no market for the gas, the simplest type of carbonizer may be used.

HEAT VALUE OF THE BRIQUETTES

The gas produced by a suitable carbonizer will average from 9000 to 10,000 cu.ft. per ton of carbonized lignite.

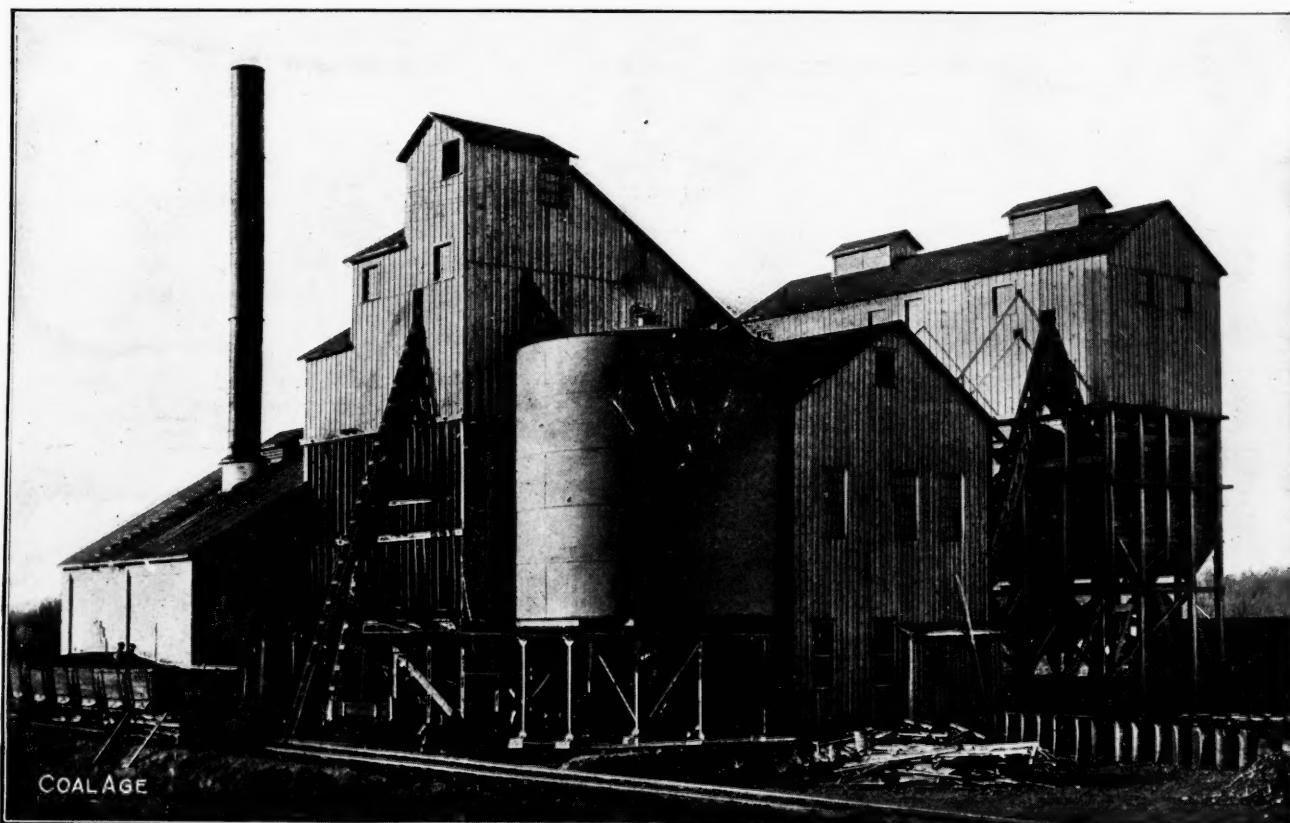


FIG. 2. CARBONIZED LIGNITE BRIQUETTING PLANT, MINOT, N. D.

The state purchased a small experimental carbonizing, gas-purifying apparatus and briquetting-plant equipment which was installed at the Experimental Station in the North Dakota lignite fields at Hebron. This plant was in operation for upwards of four years, carbonizing considerable lignite and briquetting the same, so as to prove the process a commercial success. The equipment was furnished by the Mashek Engineering Co., "Y" type, having a capacity of about two tons an hour of $2\frac{1}{4}$ -oz. briquettes, being installed.

The tests made on the carbonizing of lignite are particularly valuable as exhaustive experiments were conducted with various types of carbonizers. These varied from a closed retort, where all the gas and byproducts were saved, carefully measured and analyzed, down to what is practically a beehive oven where the byproducts are consumed, assisting in the carbonization, or allowed to go to waste. Dean Babcock's report on "Investigation of Lignite Relative to the Production of Gas and

nite of approximately a calorific value of 500 B.t.u. The average analysis of this lignite gas from practically all the Western and Northwestern lignites is as follows:

Illuminants	3.11
Carbon monoxide	17.24
Hydrogen	45.16
Ethane	0.14
Methane	15.59
Nitrogen	5.49
Oxygen	1.76
Carbon dioxide	11.51

When the lignite is properly prepared and treated in a suitable carbonizer, the gas is all given off at a temperature of 900 to 1000 deg. F. This comparatively low temperature to obtain gas is an important natural advantage which lignite possesses.

The average comparative calorific value of lignite as mined, lignite residue, briquettes and anthracite coal is approximately as follows:

	B.t.u.
Lignite as mined	7,500 to 7,800
Lignite retort residue	10,500 to 11,500
Lignite briquettes	12,000 to 12,500
Anthracite coal	12,500 to 13,500

	Moisture	Volatile	Fixed Carbon	Ash	Sulphur
Australian	1.92	3.509	54.08	2.91	0.541
New River	0.983	20.805	74.983	3.229	0.621

Using one cord of seasoned white oak as the unit of measurement, the U. S. "Navy" Department has determined the following equivalents:

Lb.
New River, average of 7 tests..... 1676
Australia, average of 10 tests..... 2225
1000 lb. of New River coal has the same fuel value as 1327 lb. of Australian coal.

The above analysis of Australian coal is wrong; the sum of the constituents (excluding sulphur, always separately determined) is 62.419 instead of 100, and the ash is entirely too low. Typical analyses of New South Wales bituminous, the coal exported to South America are given herewith.

The greater part of the Australian coals suitable for export come from two districts in New South Wales. That from the New Castle district varies considerably in quality, the best of it being similar to Pittsburgh coal and averaging about 33 per cent. volatile, with 7 to 12 per cent. ash. From the Southern district, the coals resemble Pocahontas more, although higher in ash and volatile and slightly harder, these being the best Australian coals, especially for steamship use.

At any rate, one analysis does not represent Australian fuels; there are many different kinds of coals in that country, as the following typical analyses will show:

	Mt. Aberdare	Kembala	Sydney Harbor	Southern Field ¹	New-castle ²
Moisture	1.32	1.37	0.67	0.71	2.01
Volatile	40.47	25.14	19.76	23.65	36.01
Fixed carbon	52.58	62.29	71.67	63.98	58.27
Ash	5.63	11.20	7.90	11.66	8.71
Sulphur	1.23	0.43	0.44	0.47	0.47
B.t.u. dry				13,200	13,300

¹Average of 35 samples. ²Average of 75 samples.

The analysis given of New River coal cannot be maintained in actual shipment, the ash and sulphur both being too low. A typical analysis (actual) of the best New River coal, *as shipped*, is as follows: Moisture, 1.107; volatile, 20.50; fixed carbon, 73.37; ash 4.96; sulphur, 0.828; B.t.u., 15,053, while the average of 27 cargoes shipped to the Panama Canal was: Ash, 5.395; B.t.u. dry coal, 14,881.

The oak wood equivalent tests are hardly worth considering. In the first place, it was the United States War Department, not the Navy, that made these tests; the Navy would hardly be guilty of such "tests."

This method of determining the comparative values of coals was started 20 or 25 years ago, to show the values of coals for heating purposes at the various army posts and was carried on until only a few years ago. The samples of coal used were only 1000 lb. in weight and were, in some cases, at least, selected, as I know personally, from the best coal in the mines, while the method was inaccurate and has long been a subject of ridicule, even by the Government officials.

There has never been any question as to the inferiority of Australian coals to New River and Pocahontas in heating values, but the former are hard and lumpy, make steam quickly and are excellent locomotive fuels; their price on the west coast has been such that they could compete with the better-grade coals.

With the opening of the Panama Canal, this difference in value will be overcome and the Australian coals largely eliminated from the west coast markets.

JAPANESE AS RIVALS

Although in 1913, there were 3,800,000 tons of Japanese coal exported, it is unlikely that there will be any

increase for the next year or two as the home consumption is steadily increasing and the price of coal has advanced 74c. per ton for 1914. The total output of Japan was 19,000,000 tons in 1912 and is increasing every year. Practically all of the islands are underlaid with coal and it is estimated that there are 7,002,200,000 tons available.

It is stated in the article under review that Japan's coal seams are usually small and the fuel is often a "dirty coal of steaming grade," whatever that may mean, and high in ash and sulphur; also that in the best fields the coal is mined by shafts and that all the mines are wet.

The principal coal fields of Japan are: Chikuho (most important), Taka-Shima, Hokkaido, Miike.

The Chikuho seams vary from 3 to 8 ft. in thickness. In the Taka-Shima district, there are six seams varying from 3 to 17 ft. in thickness. About 150 seams ranging from 1 to 60 ft. in thickness, occur in the Hokkaido district. The seams in the Miike field are 3 to 8 ft. thick normal, though occasionally 25 ft. thick.

Typical analysis of coals from the different fields is as follows:

	Chikuho	Taka-Shima	Hokkaido ¹	Miike
Moisture	4.21	1.16	2.74	0.66
Volatile	42.92	38.83	41.05	41.74
Fixed carbon	45.71	54.43	50.65	48.24
Ash	7.33	5.58	5.56	9.36
Sulphur	0.68	0.82	0.40	3.64
B.t.u. as received.....	12.965	12.979	13,274	13,427

¹Analysis of the main seam (24 ft. thick) in the Yuparo district.

The article states: "The Japanese coal will compete in the Far East, but not with ours or that of Australia in markets to which Japan has less convenient access." As a matter of fact, 80,000 tons of Japanese coal was brought into San Francisco in 1913, and 30,000 tons were bought by the Chilean Railways in the same year.

VANCOUVER ISLAND'S COALS

As regards western Canadian coals the article states: "The question of the ability of West Virginia to compete with the Vancouver coal is one demanding careful consideration." This followed an analysis made by the U. S. Government "of coals shipped under the trade name of Comox, Nanaimo and Wellington" which is as follows:

Moisture	1.600
Volatile	30.251
Fixed carbon	56.688
Ash	11.461
Sulphur	0.512

There is also another comparison given of heating value, based on the obsolete and inaccurate seasoned white oak standard, which shows that New River coal is 39 per cent. better than the Vancouver product. This analysis is fairly representative of the Comox coal, but there are three other seams, the Wellington, Douglas and New Castle. Recent analyses of these coals are as follows:

	Wellington	New Castle	Douglas	Comox
Moisture	1.16	1.9	1.54	1.0
Volatile	40.47	39.4	33.30	29.0
Fixed carbon	50.04	45.7	56.23	57.2
Ash	7.80	11.7	8.44	11.9
Sulphur	0.53	1.3	0.49	0.9
B.t.u.	13,410	12,470	13,446	13,010

The statement that New River coal is 39 per cent. better than average Vancouver fuel is absurd, as following comparison will show:

	B.t.u.
New River	15,006 = 100
Wellington	13,410 = 89
New Castle	12,470 = 83
Douglas	13,446 = 89
Comox	13,010 = 86

It is further stated: "The price of Vancouver coal at the loading port, f.o.b., was \$3 to \$4.50." Which figure should be taken? There is rather a wide difference. Then: "The sailing distance from San Francisco is about 950 miles" while according to Philip's tables, it is 820 miles. As to the ultimate cost at San Francisco, the article says: "I think we can safely estimate the charter rates at about \$1.50 per ton; this makes the *cost* of Vancouver coals alongside at San Francisco not less than \$6 per ton." It is clear that this is the *price* asked, not the *cost*.

Then the statement is made that New River-Pocahontas coals can be delivered at San Francisco at the same price, *omitting tolls*. From present indications, tolls must be figured in, which would add about 50c. per ton to the cost of coal. But even now Hampton Roads coals can be delivered alongside at San Francisco for \$6.24, based on a \$2.85 f.o.b. price, and a freighting bid to the U. S. Navy of \$3.39 for a cargo to be shipped in May, 1914.

The statements as to costs and heating value made by Mr. MacCorkle are said to apply to the whole western coast of the United States and to give the West Virginia coals "an absolute determinable advantage" over the Vancouver fuels at San Francisco, Mexico, Central and South America.

This whole question of the coal competition along the west coast, north of Mexico, cannot be settled or determined until the matter of ocean freight rates and canal tolls is known; it is also more than probable that there will be a readjustment of prices on the Pacific Coast coals. We believe that our strongest competitors for the North Pacific Coast trade, leaving fuel oil out, will be the British Columbia coals.

In 1912, there were 858,981 tons of these fuels shipped to the United States, about 38 per cent. of the total output.

SOUTH AMERICAN COALS

The statement is made: "At times reports have come of good coal in South America. Investigation has never proved the report true." Mr. MacCorkle is evidently not familiar with all of the reports on South American coals as investigations have shown that there *are* quite large deposits of good coal there.

There is excellent coal within 100 miles of the Pacific and a railroad is almost completed from the coal deposits to a port, 410 miles south of Panama. This coal has the following analysis (outcrop samples taken by the writer):

	No. 1	No. 2
Volatile	23.21	23.17
Fixed carbon.....	68.05	70.58
Ash	7.66	5.38
B.t.u.	14,282	14,680

The extent of this field is not accurately known, but it covers a large territory in the Cauca Valley, Colombia, estimated at 10,000 square kilometres.

There are also good coals in Venezuela, as the following analysis of outcrop samples, taken by the writer, show:

	As Received	Dry
Moisture	1.45	1.45
Volatile	46.26	46.94
Fixed carbon	50.12	50.86
Ash	2.17	2.20
Sulphur	0.82	0.83
B.t.u.	14,542	14,756

This coal is on the coast and transportation facilities could easily be provided. The Chilean coal is not "all dirty" nor does it "steam badly," nor "deteriorate rapidly." The best of it is a fair steam coal, quite equal to some of the West Virginia fuels. Under certain conditions, it has excelled Pocahontas coal as a locomotive fuel. It shows the following analysis, mine samples:

	Lota	Coronel	Curanilahue
Moisture	4.09	3.61	3.71
Volatile	37.56	34.17	35.70
Fixed carbon	55.64	55.74	55.79
Ash	2.67	6.46	4.79
Sulphur	0.20	0.28	0.64
B.t.u. as received.....	13,835	13,122	13,403

The total output of the Chilean mines in 1911 was 1,277,000 tons, the price at the mines being from \$1.20 to \$1.40 per ton.

There are also large deposits of coal in Peru, both semi-anthracite and bituminous, some of which will be available for shipment in the next two years.

China and South Africa—As Mr. MacCorkle says, there are large areas of coal in China, some of it, at least, of good quality, but one need fear no competition from this coal for some time to come.

Alaska coals—The possible competition of Alaska coals is dismissed in a few words as being of small importance, which is probably correct. Alaska mining costs and the transportation by water will be prohibitive for some time to come, apart from the question of quality.

(To be continued in issue of July 11)

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Alabama Mines Are Active

According to the figures of E. W. Parker, of the U. S. Geological Survey, in coöperation with the Geological Survey of Alabama, the production of coal in that state in 1913 was 17,678,522 short tons, valued at the mines at \$23,083,724.

The increase in coal production in Alabama in 1913 compared with that of 1912 was 1,577,922 short tons in quantity, and \$2,254,272 in value.

Labor conditions were much better in 1913 than in either 1912 or 1911, and car shortage was less acute in 1913 than in recent years, some of the large coal-carrying roads having added materially to their facilities for handling the output. The increased tonnage went principally to points outside the state.

The relations between operators and mine workers were generally harmonious and increased wages were put into force in February. Earnings by miners and mine laborers in 1913 are said to have been higher than ever before in the history of coal mining in Alabama, and improved sanitary and living conditions put into effect by many companies added to the general betterment.

The number of men employed was 24,552 as against 22,613 in 1912. The total time lost by strikes in 1913 was 27,041 days, 1048 men being idle for an average of 26 days. There were 124 men killed in the coal-mining operations of Alabama in 1913.

¶

Coal is being mined in large areas in Servia and in the Balkan basin of Bulgaria, where many seams of friable coal are found.

The Lignite Briquetting Plant at Minot, N. D.

BY G. J. MASHEK*

SYNOPSIS—With greater supplies of lignite than all other varieties of coal combined, the time is fast approaching when these low-grade fuels will be briquetted and used. In certain instances, including the one here described, this has already proved a commercial success. The plant at Minot differs from customary practice in that the lignite is carbonized in coke ovens before being briquetted.

The Northern Briquetting Co., of Minot, N. D., has erected a small commercial carbonized lignite briquetting plant. It is rated at from 8 to 10 tons an hour and has been operated up to $11\frac{1}{4}$ tons per hour, making about $2\frac{1}{4}$ -oz. over-stuffed, pillow-shape briquettes from car-

bonite, the price of which, in the Western part of the United States is extremely high. Lignite, however, is available at as low a price as 90c. a ton at the mines.

Many attempts have been made to briquette lignite in its natural state, but all of these have been failures. Raw lignite briquetted is only benefited by the amount of binder introduced, which prevents the tendency to air-slack to some extent. Little better results are obtained during combustion, for the reason that the lignite usually crumbles to dust and much more must be used for steam purposes on account of its low calorific value. Some improvements have been made in the construction of fire-boxes, special grates, etc., so that somewhat better results are obtained with raw lignite under boilers than for

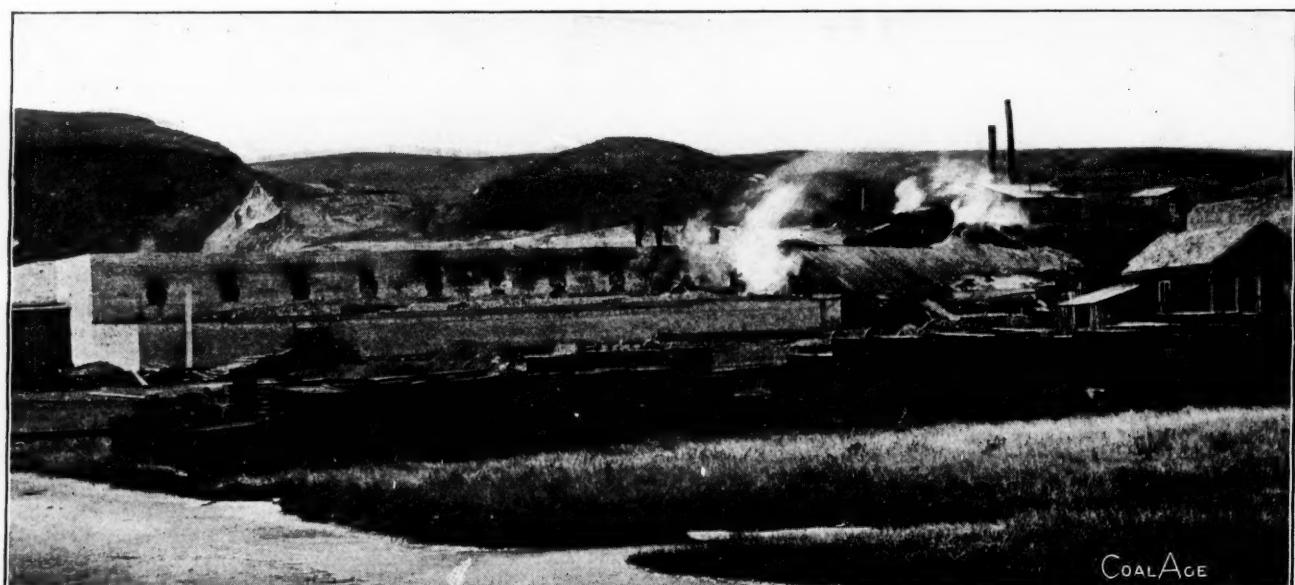


FIG. 1. BEEHIVE CARBONIZING RETORTS WHERE THE LIGNITE IS TREATED BEFORE BRIQUETTING

bonized lignite. This is the first commercial lignite briquetting plant erected in the United States, converting lignite to fuel practically equal to anthracite coal in heating value and nearly smokeless.

AMERICAN VS. EUROPEAN PRACTICE

It might perhaps be proper to mention that while the briquetting of lignite or brown coals in Europe is a large industry, these fuels are considerably different from those of the United States with the possible exception of certain Texas lignites. There are greater deposits of lignite in the Western states than of all the other coal combined, in this country. The main drawback to the development and use of this fuel has been the high percentage of moisture contained and also its air-slacking qualities, which makes it impossible to store it for any length of time.

Thus in spite of all these large deposits, most of the coal consumed in the states having the greatest lignite deposits has been semibituminous, bituminous or anthra-

merly. However, for domestic use no improvement of any consequence has been made.

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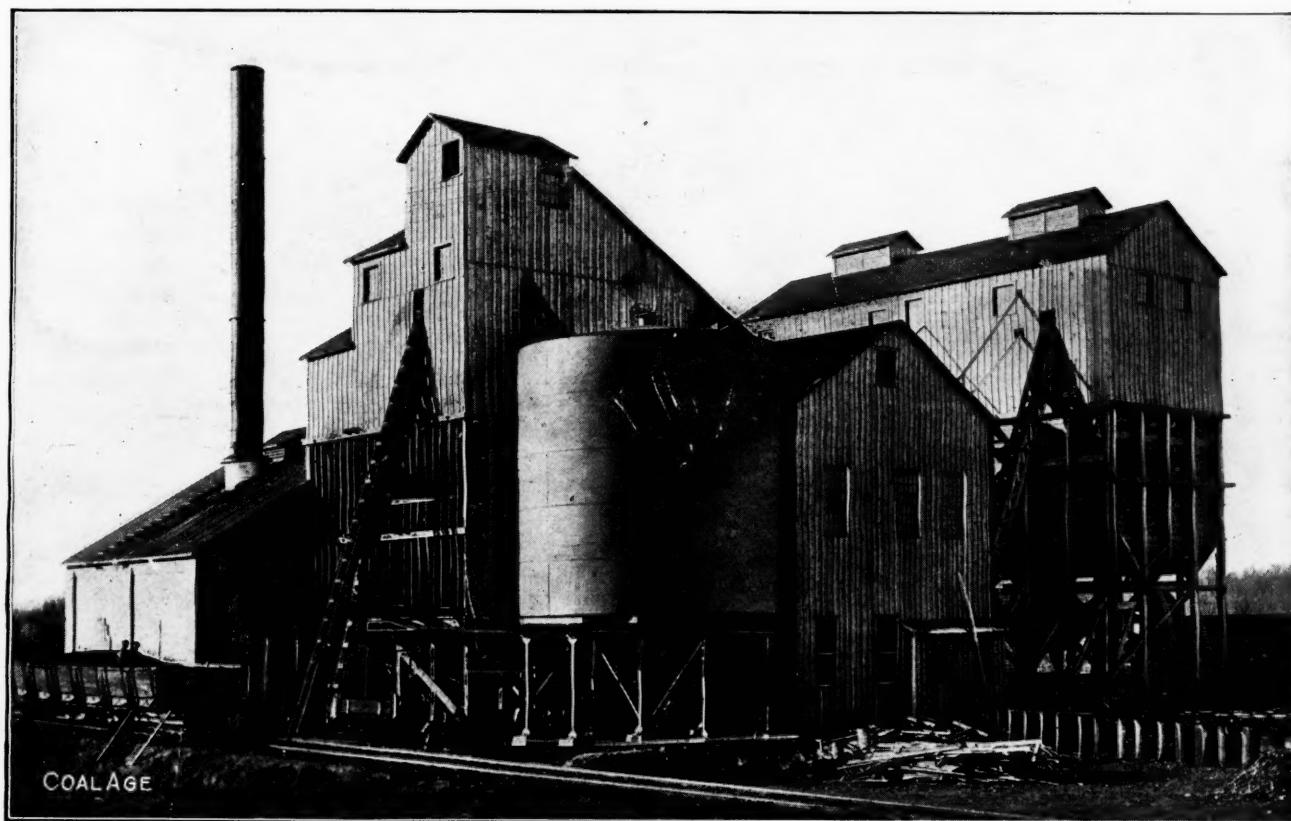


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Anthracite coal	12,500 to 13,500

And these have an average comparative analysis as follows:

	Moisture	Volatile Matter	Fixed Carbon	Ash
Lignite as mined	35.01	25.11	34.67	5.21
Lignite briquettes	0 to 6	2 to 8	75 to 85	10 to 14
Anthracite coal (a market sample)	3.68	3.26	80.51	10.55

It will be seen that converting the lignite into briquettes makes the product practically equal to anthracite coal. The carbonized lignite briquettes, however, are free-burning and if there is no market for the gas it is necessary to carbonize the fuel only enough to remove the moisture, lighter volatiles, ammonia, etc., leaving considerable volatile matter still in the residue. This produces a smokeless flame during combustion and for that reason and also on account of their free-burning qualities

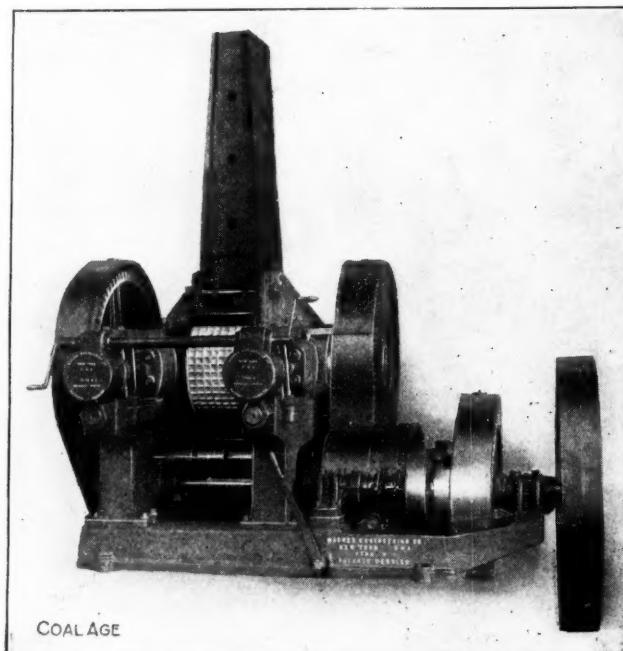


FIG. 3. A SEVEN- TO TEN-TON PER HOUR BRIQUETTE PRESS

the lignite briquettes are preferable to anthracite coal. These data are taken from Prof. Babcock's reports.

DESCRIPTION OF THE PLANT

The Northern Briquetting Co. began construction on their carbonizing and briquetting plant in the summer of 1913. Not having a market for the gas, a special type of beehive carbonizing retort was constructed at the mines, which are located about six miles from the briquetting plant. After the product is carbonized, it is transported in special gravity-discharge steel cars to the briquetting plant located in Minot. A view of the carbonizing plant is shown in Fig. 1 and the briquetting plant in Fig. 2.

This plant is equipped with special lignite briquetting machinery, size "M-1" built by the Mashek Engineering Co., of New York. It is about as small a commercial plant as was deemed advisable to install so that the cost of operation would not be excessive.

The material arriving at the briquette plant proper is discharged from the cars into a track hopper, from which it is taken by an elevator and delivered to the steel carbonized-lignite bin. This bin is 28 ft. in diameter by

about 28 ft. high, mounted on steel columns. Adjacent to the steel bin is a three-compartment wooden bin, each compartment having a capacity of approximately 200 tons; these are used for storing bituminous coal screenings, anthracite coal screenings and dust resulting from the breakage and handling of briquettes as they are loaded into cars.

All of these bins are equipped with special, automatic, measuring feeders operated by variable-speed control, the material being fed directly into a conveyor in front of all the bins. This conveyor takes the material, measured out in direct proportions required, into a special type of all-steel pulverizer which reduces the coal so that it will pass approximately a 12-mesh screen.

From the pulverizer the material is elevated to the top of the building, where it passes, by gravity, through a special steam preheater and then to a steam-jacketed mixer; part of the binder is introduced before the material reaches the preheater and the balance in the steam-jacketed mixer. This mixer is so constructed that a satisfactory product can be obtained with as low as 1½ per cent. of liquid pitch or asphaltum. The material is pugged and partially compressed in the mixer and expelled through a contracted opening into three tempering or binder-fixing mixers. From these latter the material passes to the briquette press; the passage from one machine to another, down to the briquette press is by gravity.

THE BRIQUETTE PRESS

The press, which is shown in Fig. 3, is of the two-roll, rotary type, with the briquette-shape molds in easily removable roll shells. This press has been specially built for carbonized lignite so as to get the maximum pressure without over-pressing; it is equipped with positive discharge apparatus, etc. All the gears and working parts are well protected from dust. The roll shells may be changed so that several different weight briquettes can be made, varying from 1½ to 5½ ounces.

The briquettes are conveyed from the press by a belt conveyor to a bucket elevator which takes them to the top of the bin building, where they are evenly distributed on an all-iron cooling table; they remain on this table, which is constantly in motion, for about half an hour and are then discharged into any part of the briquette bin, ready for shipment. The briquette bin is of the usual construction, with spouts and screens for loading into cars; there is a track on one side of the bin with a wagon driveway through the center and on the other side.

The binder-handling equipment in this plant is arranged to take coal-tar pitch, oil-residuum asphaltum or low melting-point gilsonite, and also has appliances for introducing a low-grade flour. This flour, during the process of manufacture, is converted into starch and dextrose. The amount of binder required to make hard briquettes capable of standing transportation and handling, is about 5½ per cent. coal-tar pitch with 1 per cent. of low-grade flour. No attempts have been made up to the present time to use gilsonite, but experiments have shown (depending on quality) that about 4 per cent. will be required to make an extremely hard briquette which is practically smokeless.

The coal-tar pitch briquettes will produce a little smoke on ignition only. The asphalt-residuum briquettes make considerably less smoke, principally on account of the

chemical change that takes place between the starch and dextrose and the asphaltum. The older the briquettes are the less smoke they will produce on ignition; they also increase in hardness with age. Carload samples of these briquettes have been exposed to the weather in North Dakota for upwards of two years, at the end of which time they were harder than when placed in the pile, and they also burned with considerably less smoke.

The size and shape of the briquette for domestic use is an important item, especially when using lignite. They must be of a size to suit local conditions and about the same as the natural coal the people in any particular locality have been in the habit of using. This eliminates the necessity of giving any special instructions as to how the fire should be manipulated, etc.; such instructions are seldom followed so that the product often fails to give satisfactory results. After considerable experimental work, it was found that carbonized lignite briquettes weighing from $2\frac{1}{4}$ to $2\frac{1}{2}$ oz. gave the best results in the markets available to this plant. The shape of the briquette should also be such as to leave a little greater air and gas opening between the pieces than would be necessary with harder coals.

OPERATING METHODS AND COSTS

Since the carbonized lignite is rather weak, the press is equipped with a special adjusting mechanism which forms the briquettes under a maximum pressure without unnecessarily crushing the particles of lignite during the operation. When a briquette will carry the weight of a 160-lb. man it is ordinarily considered sufficiently hard. The surface must also be smooth and equally as hard as the interior.

The power for this plant is furnished by two 150-hp. horizontal tubular boilers, one

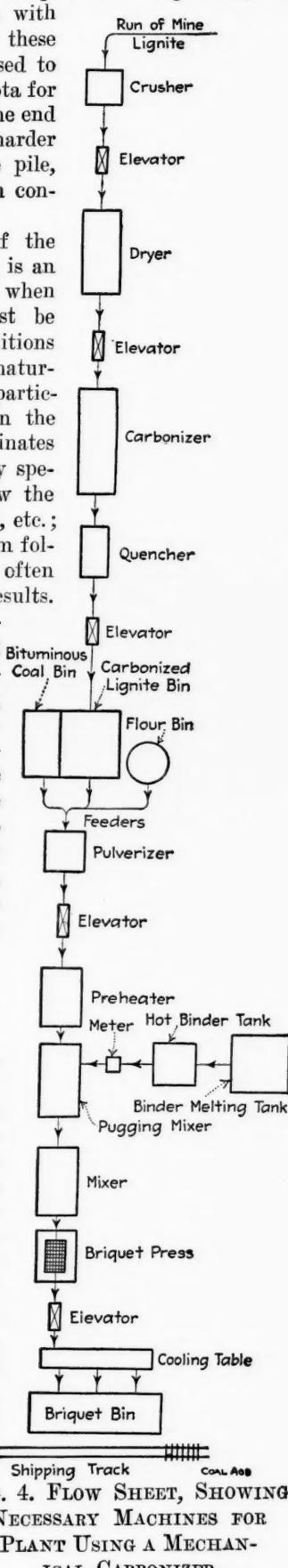


FIG. 4. FLOW SHEET, SHOWING NECESSARY MACHINES FOR PLANT USING A MECHANICAL CARBONIZER

being sufficient to run the plant continuously, using raw lignite as a fuel. The plant is driven by a 13x16-in. double-cylinder automatic engine. The power required to drive the briquette plant proper is about 72 horsepower.

The plant is automatic from one end to the other, four men per shift being sufficient to operate it. Two outside men will take care of unloading the carbonized lignite and loading the cars. The plant is so arranged that a duplicate unit can be put up without disturbing the arrangement of the machinery now in place.

In the flow sheet, Fig. 4, is shown the sequence and the necessary machines in operating a plant using a mechanical carbonizer.

The cost of manufacture and operation in detail of the complete plant is given in the accompanying table. The labor cost in operating a single-unit plant of larger capacity will be lower as the number of men required are practically the same.

The briquettes produced find a ready market in Minot and throughout the Northwest, and are retailing at from \$10 to \$11 per net ton. The price of anthracite coal is on an average of \$12 a ton.

ESTIMATED COST OF MANUFACTURING LIGNITE BRIQUETTES IN NORTH DAKOTA, TYPE "M-1" PLANT. LIGNITE CARBONIZED—GAS NOT UTILIZED
Lignite Containing 28 Per Cent. to 33 Per Cent. of Moisture, Producing 9 to 10 Tons of Briquettes per Hour, Running Two Shifts of 12 Hr. Each

Labor for Two Shifts:

Men	Rate	Total
3 Loading and unloading cars	\$2.25	\$6.75
2 Drying and crushing plant	2.25	4.50
2 Carbonizer and quencher	2.50	5.00
2 Boiler firemen	2.50	5.00
2 Mixers and briquette press	3.00	6.00
2 Cooling table, dust and briquette bins	2.25	4.50
2 Oilers and assistant plant runners	2.50	5.00
2 Binder preparing plant	2.25	4.50
2 Foremen	4.00	8.00
1 Clerk and weighmaster	3.00	3.00
1 Watchman	2.50	2.50
1 Laborer and sweeper	2.25	2.25
Total wages for two shifts		\$57.00
Labor cost per ton of briquettes (210 tons per day)		\$0.27

Binder:

6% coal-tar pitch @ \$16 per ton	\$0.96
1% low-grade flour @ \$28 per ton	0.28
5% bituminous slack @ \$4 per ton	0.20
	1.44

Boiler and Carbonizer Fuel:

225 lb. of lignite @ \$1 per ton	0.11
Rebriquetting degradation, breakage, etc.	0.06

Lignite:

1.7 tons of lignite slack @ 90c. (25 per cent. moisture)	1.53
Lubricating oil, waste, etc.	0.01

Fixed Charges:

Depreciation and upkeep of plant @ 10 per cent. estimated on minimum production of 40,000 tons per annum	0.17
Insurance @ 3 per cent.	0.03
General office and sales expense, \$7000 per annum	0.17
Contingencies, losses, etc. @ \$7000 per annum	0.17

Total average cost per net ton f.o.b. cars at plant \$3.98

COAL AGE

The Issaquah & Superior Coal Mining Co., of Issaquah, Wash., has concluded arrangements with the Independent Coal & Ice Co., an old established firm at Portland, Ore., to handle their coal there. It is believed the coal will be retailed at the rate of \$8 per ton for domestic purposes. The company's mine is at Issaquah, 26 miles from Seattle, and for the present the coal will be brought in by rail. With the completion of the Washington Canal, tracks will be built from the mines to the wharf thus enabling shipments by water. It is understood that barges will be placed in commission and this will mean a saving of at least \$1 a ton on coal shipped to this port. The Issaquah company is owned by a German syndicate organized about 16 months ago and approximately \$1,000,000 has already been expended in the ground and development work. Ninety attractive cottages have been erected for the workmen and their families and a good sized community has already been established.

It is the intention of the company to utilize all of the byproducts as is done in the mines in Germany, and it is expected to begin the manufacture of creosote in the near future. There is a big demand for creosote on Puget Sound.

The Labor Situation

SYNOPSIS—Colorado is quiet except for rumors of drastic action by the President. Many firearms have been surrendered in the northern part of the state. "Mother" Jones has been denied admission to Canada by the Immigration authorities. Serious trouble was feared in West Virginia, but affairs there are now pacific.

■

Quiet still reigns in Colorado, the strong hand of the federal troops not being removed; however some lack not of strength, but of intention threatens to cause trouble. So long as rumors come that the President intends to close the mines on some near date if the operators do not agree to arbitration, the agitators feel that there is hope for success if they can only prevent a resumption of work on the part of the miners now on the union pay-rolls. The date set for this ultimatum of the President is said to be June 20, the day on which this report will leave the press, but this has been denied, not however so vigorously as to remove anxiety that the President is considering such a high-handed proceeding.

To lay men idle is surely one of the last ways in which to promote peace. Idle men are always strife makers. Of course the President would intend should he take this action, not to secure peace so much as to terminate the strike by removing its cause. But in this, his action would not be in any sense military, but legislative and it is clearly not his business to legislate for Colorado. We doubt whether he would compel the arbitration of labor disputes in Vera Cruz should a disturbance arise among the employees and employers in that city, and he has no more right to do so in Colorado. He should be very careful not to interfere with the prerogatives of the legislators of the state or nation.

WHY MARTIAL LAW IS DECLARED

Martial law is declared because it replaces the slow progress of law making for the rapid necessities of a military situation and because it puts the control in the hands of those who being disinterested can deal with the situation without local prejudice. But if the people of Colorado have for years refused to pass a law requiring arbitration should Mr. Wilson pass it for them? The closing of saloons and shutting off of ammunition, an expulsion of those without occupation and like actions are necessary precautions but interference with peaceful industry is not regarded as within the sphere of martial law.

Weakness also is shown in expelling working men while admitting agitators. At first the Union was told that the agitators would probably not be admitted. Later Fred D. Thomas and Andrew Reese, two Pennsylvania organizers, arrived and were compelled by the troops to remain at their hotels. However, Robert Burt, of Iowa, was permitted to take charge of the Walsenburg headquarters. But Col. J. Lockett finally received orders to let in all the agitators of the Union. They are required, however, to do "nothing which will irritate or inflame the situation."

On June 3, an interurban car enroute to Cokedale was fired at just outside the city limits. The bullets just missed the car which carried many passengers. Two Austrian coal miners on their arrival from Raton, New Mexico, were met by union pickets and taken to headquarters. These Austrians say they were told to join the Union and threatened with death if they went to work at the mine at Sopris, to which they were bound. They were kept at headquarters for two hours, at last making their way through town surrounded by 3000 or more strikers, but they were finally rescued by a policeman and a constable and forwarded on a car to Sopris.

Col. Lockett seems from the reports, which we hope do not do him justice, to be more interested to know whether they were invited to come to work on some of their own incentive than to determine who threatened them with death and who detained them on their way. Could it be possible that the Colorado Fuel & Iron Co. was endeavoring to replace some men who had left because they feared death at the hands of the strikers? This is, from reports, Col. Lockett's problem.

NO IMMEDIATE PROSPECT OF ARBITRATION

As usual there come reports of the probable success of arbitration, but the recognition of the Union is the unvarying demand of the officials and the companies do not seem any

more willing than before to concede it. John Lawson says, "I do not know of any prospects of a settlement. The miners will never go back without recognition of the Union if they follow my advice."

INVESTIGATORS ARE PLENTIFUL

Colorado is full of investigators who get most divergent results according to the parties to whom they listen. The state conciliators are back from their various trips and Senator S. K. Burris, the chairman, says "We will settle the strike." Senator Burris and his committee had been in conference with J. F. Welborn, President of the Colorado Fuel & Iron Co., and had been recognized by him as a conciliation or mediation committee.

Meantime Hywell Davies and William R. Fairley have been investigating and have returned to Washington to inform the President regarding conditions. J. B. Densmore, solicitor for the Department of Labor and Ida Tarbell both put absenteeism as the root of the trouble. That is, we believe, partly true. It is not perhaps being helped by the President's continued absence in Washington, from the trouble in Colorado. But the President tries to control the situation, whereas the absenteers of the Colorado Fuel & Iron Co. leave that to their lieutenants in the field which is, on the whole, a far wiser plan.

LIQOR SELLING HAS BEEN PROHIBITED

Governor Ammons has prohibited the sale of liquor all over the northern Colorado strike district and over 500 guns including pistols and rifles and over 5000 rounds of ammunition have been surrendered by the miners in northwestern Colorado. Whether this confiscation has disarmed the law-abiding only, we do not know. The disarming of the citizens who only use arms for defence will not improve conditions when once the military forces are removed.

Representative Keating and Senator Owens respectively introduced into the House and Senate a bill for a commission of five persons to pass upon and inquire into the questions in controversy between operators and strikers in the Colorado coal fields. A report is to be made to Congress not later than Dec. 1, 1914.

MOTHER JONES DEBARRED

Temporarily Colorado has been spared the annoying presence of "Mother" Mary Jones. She went to New York, then to Seattle, and tried to reach Nanaimo, Vancouver, that she might make trouble there, but the Canadian immigration inspection service stopped her and now an appeal has been made to President Wilson in the hope that he will cause the Canadians to admit that "daughter of discord."

MORE TROUBLE AT COLLIER

The situation at Colliers, West Virginia, was for a time desperate. The village is situated in Brooke County, one of the four counties forming the panhandle of Ohio. The trouble was in the mines of the West Virginia & Pittsburgh Coal Co. and lasted about nine months.

The strike seemed a short while ago to be nearing an end. Most of the strikers had left the region. But at one time there were some 600 men affected who worked normally in three different mines. Two murders had been committed and several persons had been assaulted and shot.

On hearing that the houses occupied by strike breakers of the West Virginia & Pittsburgh Coal Co. had been riddled with shots, Governor Hatfield telegraphed Sheriff George Patterson that he must keep order. The sheriff made an investigation and reported that there was no breach of the peace which he could not handle.

Superintendent R. Z. Virgin had a narrow escape from being shot when he was fired on from ambush, and on June 11 an attack was made on the Locust Grove mine of the West Virginia & Pittsburgh Coal Co. Shots were fired and a dynamite bomb was exploded at the mine entrance. The occasion for the recrudescence of trouble seems to be a number of suits listed in the courts of Brooke County for the ejection of strikers from the houses of the West Virginia & Pittsburgh Coal Co. Two months ago, Governor Hatfield sent Captain C. R. Morgan to investigate the situation.

Recently the strikers were told that no further money will be forthcoming as the money used in Ohio and Colorado had depleted the funds. However, President Van Bittner, of Pittsburgh, promised that strike benefits would be paid. It is now stated that the whole trouble is ended by an agreement between the contending parties.

Mine Inspectors' Institute, U. S. A.

By J. T. BEARD

SYNOPSIS—Principal features of the seventh annual meeting of the Institute, held at Pittsburgh, Penn., June 8-12, 1914. Description of the demonstration given by the Federal Bureau of Mines for the entertainment and instruction of the visiting members of the Institute, at their testing station in Pittsburgh, and at the experimental mine at Bruceton. Election of officers of the Institute for the ensuing year.

The seventh annual meeting of the Mine Inspectors' Institute of the United States of America, held at Pittsburgh, Penn., last week, was largely attended by the members of the Institute, their wives, daughters and many friends. The visitors included a large number of prominent mining men from different states, who were privileged to attend the open sessions of the Institute and to enjoy the entertainment given the members.

The first day of the session, Monday, was devoted to the registration of members and other preliminary arrangements. A meeting of the executive committee was held to consider various details of the organization and complete the program for the meeting.

usually explain these conditions as contributing to the increase of the death rate. Prominent among these causes, he stated, was the employment, in our mines, of an exceptionally large proportion of foreign labor, and a greater production of coal, per capita, than in any other country. The paper was thoroughly discussed by the members, in the afternoon session of the same day.

In the evening the Institute and its guests enjoyed a steamboat ride on the Monongahela River. The steamer "Sunshine" had been engaged for the occasion and was well furnished with refreshments, music by an orchestra and other means of entertainment that contributed much to the enjoyment of the evening. The trip extended as far up the river as McKeesport.

The second session of the Institute, Wednesday, was marked by an interesting and valuable paper by John Dunlop, a former state mine inspector of Illinois. The paper described the utility and advantage of the use of "booster fans," under certain conditions in mining where it was necessary to resort to some means of increasing the circulation of air in the mine, but where the expectation would not warrant the necessary outlay for the in-

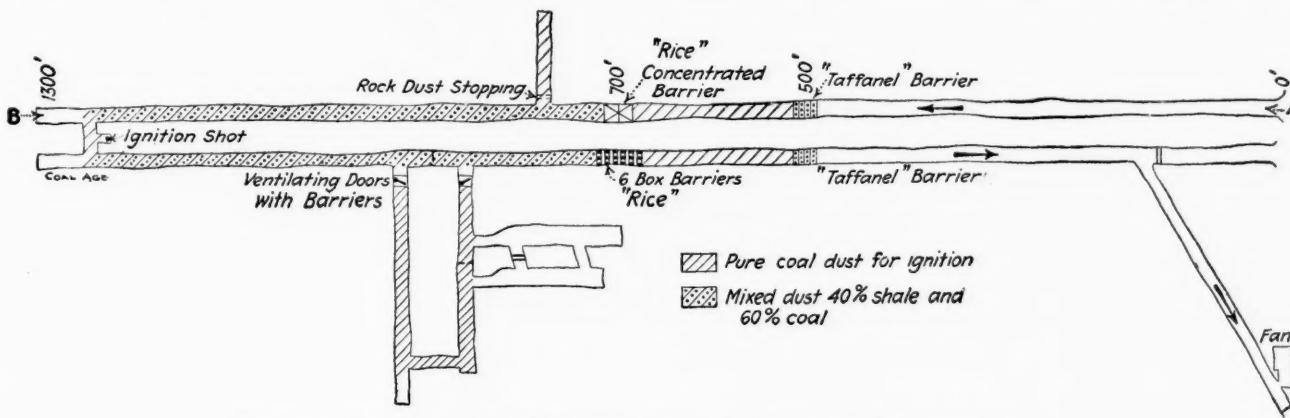


DIAGRAM ILLUSTRATING EXPLOSION TEST No. 120, AT BRUCETON MINE

The opening session of the Institute, Tuesday, June 9, was called to order by the former president, Thomas K. Adams, Pennsylvania, who after a few brief remarks introduced City Solicitor Charles A. O'Brien, representing Mayor Joseph G. Armstrong. Mr. O'Brien delivered the address of welcome and was followed by D. P. Black, president of the Chamber of Commerce, who also extended a hearty welcome to the members of the Institute and their friends, in behalf of the Chamber of Commerce.

At the conclusion of these addresses of welcome, the president of the Institute, David J. Roderick, Pennsylvania, responded in a few words expressing appreciation of the welcome so freely extended to the Institute by the city. Mr. Roderick then followed this with a carefully prepared paper, bearing on the prominent features of the coal-mining industry that give rise to mine accidents. He drew special attention to those conditions that have increased the fatality rate in the mines of this country, and which do not exist to the same degree in other countries. Mr. Roderick much deplored the fact that the published lists of mine fatalities in this country did not

stallation of another permanent fan on the surface. The paper provoked an animated discussion among the members and proved one of great interest. At the same session a paper on "First Aid to the Uninjured" was read by P. J. Moore, anthracite mine inspector, Pennsylvania. Mr. Moore's paper was valuable, as pointing out the need of precautionary measures to prevent the frequent recurrence of mine accidents, and emphasized the importance of educating the large class of foreign labor and other ignorant workers in the mine, so as to enable them better to protect themselves and avoid injury. While complimenting the great work that had been done in the training and development of efficient rescue corps at many mines, Mr. Moore claimed that the same interest should be taken to prevent, as far as possible, the accidents that made rescue work necessary.

The discussion of this paper was followed, in the evening, by a largely attended banquet of the members and guests, at the Monongahela House. The principal addresses of the evening were made by H. M. Wilson, of the Federal Bureau of Mines; David Ross, former Commis-

sioner of Labor, Illinois; Samuel A. Taylor, mining engineers of Pittsburgh; W. L. Affelder, E. E. Bach and W. R. Crane.

Thursday was devoted to a visit to the testing station of the Bureau of Mines. Following a brief address by H. M. Wilson, of the Bureau, explaining its purposes and describing the work accomplished and that projected, a number of interesting tests demonstrating the explosibility of coal dust, behavior of safety lamps, use of rescue appliances, etc., were witnessed by the members present.

In the afternoon, at the invitation of the Bureau, the members of the Institute boarded a train for Bruceton, where they witnessed an explosion in the experimental mine at that place. The test was designed, primarily, to show the efficacy of different kinds of stone-dust barriers to arrest the propagation of an explosion in the mine entries. The accompanying diagram shows the general arrangement of the mine. Three types of barriers had been constructed in the main headings at points 500 and 700 ft., respectively, from the entrance to the mine. As shown in the sketch, the well known Taffanel barrier was located 500 ft. inby from the entrance. This consisted of ten dust-laden shelves spanning the roadway.

At a point 200 ft. inby from these barriers were located two other barriers designed by George S. Rice, mining engineer of the Bureau. As indicated on the diagram, one of these barriers was of the concentrated type and consisted of two 7-ft. platforms, swung above the roadway and loaded with $2\frac{1}{2}$ tons of shale dust. Between these two barriers, as indicated in the diagram, was a pure coal-dust zone, the dust being placed on shelves along the entry, to the amount of 2 lb. of dust per lineal foot of roadway. This zone was designed to determine whether the explosive wave passed the concentrated barrier at the 700-ft. station.

Inby from that station, the entire entry was stored with mixed coal dust and shale, the latter forming 40 per cent. of the mixture. The load here amounted to $3\frac{1}{2}$ lb. per lineal foot, of which 2 lb. was placed on the side shelves and the remainder on the cross-shelves, in the entry. A similar formation of dust zones was prepared on the return entry, as indicated in the diagram.

The ignition shot, as shown, was located in a short blind cut made in the outby rib of the crosscut at the head of the entry. A charge of black powder was fired from a cannon at this point and discharged into the crosscut against the inby rib. The blind cut in which the cannon was placed was stored with 25 lb. of very fine coal dust; and the crosscut was likewise stored with 100 lb. of similar dust, the latter being placed on shelves, while the former was scattered or spread on the floor of the entry.

On the return air courses, the barrier erected at the 700-ft. station consisted of six boxes, spaced 10 ft. apart, center to center, each box being loaded with 700 lb. of shale dust, making the entire load somewhat over two tons. These boxes were arranged so as to be upset by the force of the explosion acting against them. The concentrated barrier at the 700-ft. station on the intake entry was connected by wire with a device about 100 ft. inby on the entry, and so arranged that the hinged platforms would drop and discharge their load into the airway at the moment the explosive wave reached that point.

An interesting feature of this test consisted in the fact

that an air current of practically 40,000 cu.ft. per minute was circulated in the mine previous to and during the explosion. This current entered the intake airway at the point marked *A* on the diagram, and passing through the crosscut at the head of the entry returned to the fan, which was operated on the exhaust system. This fan was running at a speed of 245 revolutions per minute.

Pressure manometers stationed at different points in the mine were connected with delicate instruments for recording the pressure throughout the mine at any instant. These instruments were located in the office on the surface and furnished a more or less complete record of what took place in the mine. Tinfoil circuit-breakers, likewise connected by electric wires with instruments in the office on the surface, were used to measure the velocity of the flame. Wires also connected all the rock-dust barriers used in this test, except the Taffanel barriers, and served to indicate the time when the explosive wave reached them.

The test appeared to be quite satisfactory and demonstrated, to a degree, the efficacy of coal-dust barriers to arrest the propagation of an explosion in mine entries. At the moment of explosion there was a distinct shock felt, and a few seconds later a huge puff or blast of smoke and dust issued from the main entry at *A*. This, however, was unaccompanied by any evidence of flame. About the space of three seconds after this blast from *A*, there was a light puff of dust and smoke that issued from the mine where the fan drift enters the return air course. This, however, was very light.

In the evening, the members of the Institute and guests were banqueted at the Seventh Avenue Hotel, at which time all the ladies of the party were present, and an eloquent address was given by David Ross, former Labor Commissioner of Illinois.

The last day of the session, Friday, June 12, was marked by the reading of two valuable papers, the first entitled "The Value of Organized Effort in Increasing Safety in Mines," by Mine Inspector I. G. Roby, of Pennsylvania; and the second entitled "Some Recent Experiments Pertaining to Control of Mine Explosions," by George S. Rice, engineer Bureau of Mines. These papers were both followed by discussion. The reports of committees and the election of officers, together with the selection of St. Louis, Mo., as the place for holding the next annual meeting, closed the business of the session. The afternoon was devoted to an inspection of the principal features of interest in and about the city, automobiles being provided for the purpose.

The following officers were elected for the ensuing year: John Dunlop, Peoria, Ill., president; J. B. McDermott, Helena, Mont., first vice-president; George E. Sylvester, Rockwood, Tenn., second vice-president; Thomas Graham, Victoria, B. C., Canada, third vice-president; James W. Paul, Pittsburgh, Penn., secretary; R. S. Wheatley, Salineville, Ohio, assistant secretary; Joseph Knapper, Dravosburg, Penn., treasurer; J. T. Beard, New York City, editor-in-chief.

The meeting, taken as a whole, was one of the most successful thus far held. There was a larger attendance of members than on any previous occasion. This was chiefly due to the fact that the place of meeting was the most central point in the coal fields, and more easily accessible than any other point that could have been chosen.

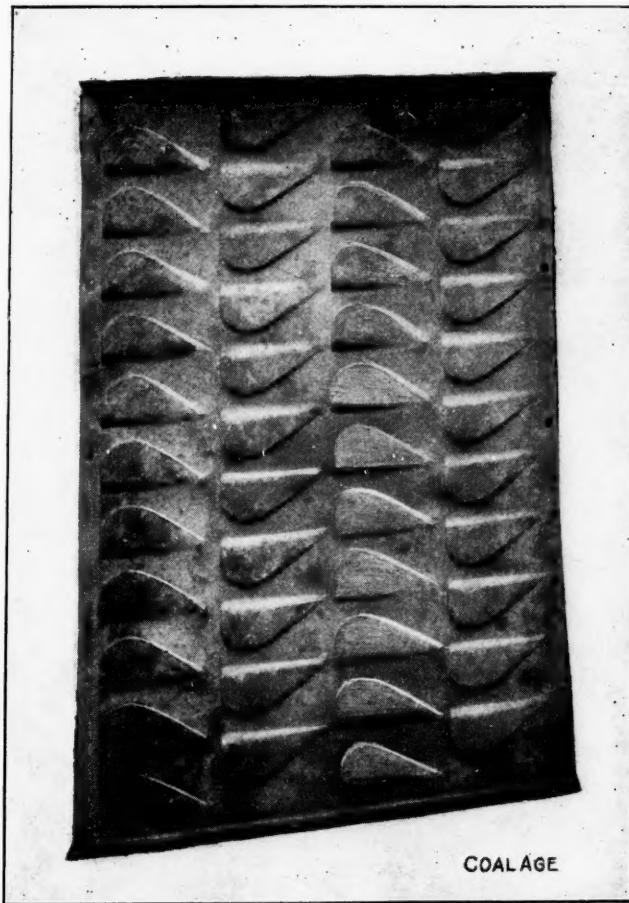
New Anthracite Discovery

An anthracite coal field has recently been discovered in the Province of British Columbia, Canada, within two miles of the G. T. P. Railway, main line. Frank Frank, of Vancouver, B. C., and for years a prominent coal man of Ontario, has located several seams, one apparently 40 ft. wide, and has had an analysis made of the coal outcroppings discovered showing: Carbon, 80.93 per cent.; volatile matter, 7.07 per cent.; moisture, 4.02 per cent.; and ash, 7.98 per cent. Specific gravity, 1.661. The coal makes a strong and lasting fire, free from clinker. The early development of this field will mean a great deal to the entire Pacific coast, as well as to the Asiatic markets. Iron ore is also much in evidence.



A Simple Slate Picker

One of the most difficult problems encountered in the preparation of anthracite is the efficient removal of the slate and refuse from the coal. In the smaller sizes such as pea, hand picking is out of the question, and



SEMI-PERFORATED PLATE OF THE KERRIGAN SLATE PICKER

if this slate is not removed in some manner the ash content of the fuel may be extremely high.

Many ingenious mechanical devices have been tried for slate removal, one of the simplest of which is the Kerrigan slate picker, manufactured by the Cross Engineering Co., of Carbondale, Penn. This consists of what might be termed a semi-perforated plate, as shown in the accompanying illustration, which is usually attached to the end

of the screen. The slot leaves cut in the plate are raised to allow the slate, bone, and other flat refuse, which is heavier than the coal, to pass through, while the coal itself passes over.

This device will clean coal from No. 1 Buckwheat up, but has proven especially satisfactory in the removal of flat refuse from pea, nut, and stove sizes, and when placed upon the end of mud screens will automatically remove all but about 2 per cent. of the slate and other flat refuse.

This device is most frequently used on the discharge end of jigging screens, and does not decrease the screening area. It has also been found satisfactory when used at a point above where the coal enters the jig.

The slot leaves are adjusted for a given size of coal such as chestnut, for instance, at the time of manufacture, but may be easily readjusted to meet the sometimes varying conditions found in different localities.

Increasing Hoisting Capacity

BY RALPH W. MAYER*

The capacity of the haulage plant at a mine of the Northwestern Improvement Co., at Roslyn, Wash., was almost doubled recently by the addition of one electric locomotive to supplement the work of the hoisting engine.

At this mine the coal measure lies at an inclination of about 20 deg., outcropping at the top of a hill and extending beneath a valley. It is worked by means of a slope driven in the coal. The railroad tracks and tipple are located at the foot of the hill, a tunnel being driven from the tipple until it intersects the slope. Partings and side tracks are made at both ends of this tunnel.

The hoisting engine is located on top of the hill at the mouth of the slope. It had been the custom to hoist the coal up the slope and drop the loads back onto the parting at the slope end of the tunnel. At every second hoist the cars were coupled together on this parting and dropped out of the tunnel to the tipple by the hoisting engine and rope, the grade of the tunnel being sufficient to allow the loads to run by gravity after they had been pulled up the slope a sufficient distance to give them a start.

By using the hoisting engine only to handle the cars on the slope, and depositing them at the parting and providing a motor to handle the cars in the tunnel, the output has been practically doubled at a cost of only a motorman, the expense for power, and the maintenance of the locomotive.

The motor enters the tunnel at the head of a trip of empties, leaving them on the empty track next the slope. This side track is long enough to accommodate several trips of empties, and has a slight down grade toward the slope, so that when the motor is uncoupled there is no danger of the cars running out of the tunnel. This avoids the use of safety blocks or derail switches, and the lost time incidental to their use.

The switch at the outer end of this parting is spring operated and set for the empty track, while the inside switch is an automatic one set for the loaded track. A lever, to which a chain is fastened, is pivoted to an ordinary switch stand. The chain passes over a pulley and a weight is attached to the end of the chain. This holds

*Roslyn, Wash.

the switch set for the loaded track and allows the cars to be pulled off the empty track, but can be thrown over for this track when necessary.

When set for the loaded track it is in the correct position for both the hoisting engine pulling out of the slope and the motor hauling out of the tunnel.

When the motor uncouples from the empties it runs around the end of the parting through the automatic switch onto the loaded track and pushes the loads. The switch stand for the empty and loaded tracks at the tipple is placed a trip's length inside the tunnel from the switch, and connected therewith by means of rods the same as is done on railroads. The motorman pulls his empty trip off the empty track clear of the switch and without leaving his seat throws the lever which sets the switch for the loaded track so that he has a clear road to the end of the tipple when he returns with the loads. A stand is also placed at the switch and so connected that the latter may be thrown from either place.

NO DELAY IN HANDLING MINE TIMBER

Formerly all mine timber was loaded on cars while on the main track and the haulage system over the entire mine would be at a standstill while two men loaded the timber. In their eagerness to cause as little delay as possible, they would sometimes fail to fasten securely long timbers and rails and accidents would result. Lowering the timber on the night shift when few men were working was tried. This avoided the delay to the hoisting during the day, but the timbers had to be unloaded in the mine and reloaded during the day to distribute them to the working places. A switch and side track to the timber yard at the tipple has now been put in.

The motorman with the loss of but a few minutes' time drops a trip of empties into this side track and goes on with his hauling. The timber men then load the cars and have sufficient time to do it properly not being rushed for a few minutes and doing nothing for a long time.

Tonnages of Bituminous Coal Plants

We recently called attention to the size of some of the large coal plants in Pennsylvania and Illinois and to stimulate emulation of the records in these states, we print the lists we have collated in full. Many a thriving coal district fails to do as well as the single Iselin plant in Indiana County.

It is only fair to say that if the figures for 1913 were taken, the order would not be the same. Important advances have been made at Vesta No. 5 and at Lucerne. Unfortunately the records of the production of the various states are so far behind the present date that a really timely table cannot be constructed.

TONNAGES OF LARGEST BITUMINOUS PLANTS IN PENNSYLVANIA 1912

Company and Plant	Tonnage
1 Pittsburgh Gas Coal Co., Iselin Nos. 1-2-3-4.....	1,776,410
2 Vesta Coal Co., Vesta No. 4.....	1,555,420
3 Monongahela River Consolidated Coal & Coke Co., Crescent.....	972,222
4 Westmoreland Coal Co., Export Nos. 1-2.....	955,622
5 Cowanshannock Coal & Coke Co., Yatesboro.....	952,027
6 Buffalo & Susquehanna Coal & Coke Co., Sagamore Nos. 13-15 16-17-18.....	913,786
7 Pittsburgh Coal Co., Moon Run Nos. 1-2-3.....	798,161
8 Washington Coal & Coke Co., Washington No. 2.....	740,517
9 H. C. Frick Coke Co., Standard Nos. 2-3.....	731,005
10 Cambria Steel Co., Rolling Mill.....	724,168
11 Jamison Coal & Coke Co., Jamison No. 4.....	723,120
12 Washington Coal & Coke Co., Washington No. 1.....	716,936
13 Berwind-White Coal Mining Co., Eureka No. 36.....	709,683
14 Pittsburgh-Westmoreland Coal Co., Acme 1-2.....	678,837

15 Jefferson & Clearfield Coal & Iron Co., Ernest Nos. 1-2-3-4.....	673,956
16 Northwestern Mining and Exchange Co., Eriton.....	658,014
17 Berwind-White Coal Mining Co., Eureka No. 40.....	645,014
18 Jamison Coal & Coke Co., Jamison No. 2.....	644,500
19 Pittsburgh Terminal R.R. & Coal Co., G or No. 7.....	641,040
20 Westmoreland Coal Co., Criterion.....	622,211
21 H. C. Frick Coke Co., Shoaf Nos. 1-2.....	599,876
22 Westmoreland Coal Co., Magee.....	592,707
23 Rochester & Pittsburgh Coal & Iron Co., Lucerne Nos. 1-2-3.....	591,169
24 Pittsburgh Terminal R.R. & Coal Co., C or No. 3.....	586,914
25 Pittsburgh Coal Co., Banning.....	582,896
26 Rochester & Pittsburgh Coal & Iron Co., Eleanor Shaft.....	579,714
27 Pittsburgh Buffalo Co., Hazel.....	567,350
28 Pittsburgh Terminal R.R. & Coal Co., B or No. 2.....	567,209
29 Berwind-White Coal Mining Co., Eureka No. 35.....	566,577
30 Rochester & Pittsburgh Coal & Iron Co., Adrian No. 1.....	563,356
31 Ellsworth Collieries Co., Ellsworth No. 2.....	557,082
32 Keystone Coal & Coke Co., Salem.....	551,800
33 Pittsburgh-Buffalo Co., Rachel.....	551,570
34 Pittsburgh Terminal R.R. & Coal Co., F or No. 6.....	549,888
35 Jamison Coal & Coke Co., Jamison No. 3.....	548,400
36 Jenner Quemahoning Coal Co., Jerome No. 1.....	545,306
37 Clearfield Bituminous Coal Corporation, Canoe Ridge Nos. 1-2-3-4.....	544,764
38 Blaine Coal Co., Blaine.....	534,846
39 Allegheny Coal Co., Hancock Shaft.....	531,235
40 Penn Gas Coal Co., Penn Gas No. 2.....	524,997
41 Ellsworth Collieries Co., Ellsworth No. 1.....	524,101
42 H. C. Frick Coke Co., Ronco.....	512,437
43 Penn Gas Coal Co., Penn Gas No. 3.....	507,604
44 Rochester & Pittsburgh Coal & Iron Co., Helvetia-Stanley.....	504,826
45 H. C. Frick Coke Co., Buffington.....	504,579
46 H. C. Frick Coke Co., Edenden.....	503,485
47 New York & Cleveland Gas Coal Co., Belmont Nos. 1-2-3.....	503,225
48 Pittsburgh-Westmoreland Coal Co., Schoenberger.....	501,729
49 H. C. Frick Coke Co., Leckrone Nos. 1-2-3.....	493,128
50 Vesta Coal Co., Vesta No. 5.....	487,039
51 Ellsworth Collieries Co., Ellsworth Nos. 3-4.....	487,000
52 Monongahela River Consolidated Coal & Coke Co., Alice.....	485,749
53 Berwind-White Coal Mining Co., Eureka No. 37.....	476,605
54 H. C. Frick Coke Co., Mammoth Shaft.....	471,626
55 National Mining Co., National No. 2.....	470,878
56 Youghiogheny & Ohio Coal Co., Osborne Nos. 1-2.....	469,569
57 Monongahela River Consolidated Coal & Coke Co., Fayette City.....	468,896
58 Taylor Coal & Coke Co., Searight.....	467,302
59 H. C. Frick Coke Co., Continental No. 1.....	462,410
60 Thompson-Connellsville Coke Co., Thompson No. 1.....	461,894
61 Bessemer Coal & Coke Co., Bessemer No. 1.....	461,569
62 National Mining Co., National No. 1.....	458,537
63 Berwind-White Coal Mining Co., Eureka No. 42.....	458,415
64 Ocean Coal Co., Ocean No. 2.....	457,444
65 Keystone Coal & Coke Co., Carbon.....	455,792
66 Keystone Coal & Coke Co., Sewickley.....	454,613
67 Monongahela River Consolidated Coal & Coke Co., Black Diamond.....	453,115
68 Jenner-Quemahoning Coal Co., Jerome No. 2.....	452,714
69 H. C. Frick Coke Co., Lemon No. 1.....	452,198
70 Keystone Coal & Coke Co., Keystone Shaft.....	449,171
71 United Coal Co., Rich Hill.....	448,910
72 Ocean Coal Co., Ocean No. 1.....	445,037
73 H. C. Frick Coke Co., Southwest A & B.....	443,170
74 Republic Iron & Steel Co., Republic.....	442,389
75 H. C. Frick Coke Co., Leisenring No. 3.....	441,666
76 Brier Hill Coke Co., Brier Hill.....	441,655
77 H. C. Frick Co., Bridgeport.....	440,881
78 Pittsburgh Coal Co., Arnold No. 2.....	438,840
79 H. C. Frick Coke Co., Trotter.....	436,878
80 H. C. Frick Coke Co., Leisenring No. 1.....	436,387
81 Pittsburgh Coal Co., First Pool No. 2.....	434,932
82 Monongahela River Consolidated Coal & Coke Co., Apollo.....	434,627
83 Pittsburgh Coal Co., Mansfield No. 2.....	426,694
84 Diamond Coal & Coke Co., Huston Run.....	425,678
85 Northwestern Mining & Exchange Co., Dagus Nos. 1-2-3, Eureka.....	425,201
86 Jefferson & Clearfield Coal & Iron Co., Soldier Nos. 1-2-3-5.....	424,917
87 Westmoreland Coal Co., Westmoreland Shaft.....	424,829
88 H. C. Frick Coke Co., Footedale.....	424,491
89 H. C. Frick Coke Co., Leisenring No. 2.....	422,297
90 H. C. Frick Coke Co., York Run.....	421,185
92 H. C. Frick Coke Co., Phillips.....	416,350
93 Valley Camp Coal Co., Valley Camp.....	415,960
94 Saltsburg Coal Co., Foster Nos. 1-2-3.....	415,339
95 H. C. Frick Coke Co., Lambert.....	411,458
96 Pittsburgh Coal Co., Harrison.....	409,781
97 Allegheny River Mining Co., Conifer No. 3.....	405,140
98 Buffalo & Susquehanna Coal & Coke Co., Du Bois No. 2.....	404,934
99 Monongahela Valley Consolidated Coal & Coke Co., Tremont.....	403,982
100 Rochester & Pittsburgh Coal & Iron Co., Florence Nos. 1-2.....	402,102
101 Monongahela Valley Consolidated Coal & Coke Co., Lovedale.....	401,736
102 Pittsburgh Coal Co., Midland No. 1.....	401,050
103 Lincoln Coal & Coke Co., Lincoln No. 1.....	401,000

TONNAGES OF LARGEST PRODUCERS IN ILLINOIS

1 Superior Coal Co., No. 3.....	837,979
2 Superior Coal Co., No. 2.....	791,835
3 New Stanton Coal Co., No. 1.....	737,632
4 Superior Coal Co., No. 1.....	673,717
5 Bunsen Coal Co., Vermilion.....	640,664
6 Big Muddy Coal & Iron Co., No. 8.....	570,695
7 St. Louis & O'Fallon Coal Co., No. 2.....	564,708
8 Bunsen Coal Co., No. 4.....	561,169
9 Johnson City Coal Corporation, No. 1.....	540,236
10 Consolidation Coal Co., No. 14.....	534,485
11 United Coal Mining Co., No. 1.....	524,163
12 O'Gara Coal Co., No. 9.....	523,583
13 Consolidated Coal Co., No. 17.....	516,913
14 Mt. Olive & Stanton Coal Co., No. 2.....	506,044
15 Saline County Coal Co., No. 2.....	498,223
16 Chicago, Wilmington & Vermilion Coal Co., No. 1.....	486,140
17 Ziegler District Colliery Co., N mine.....	475,386
18 Jones Adams Coal Co., Peerless.....	472,380
19 Consolidated Coal Co., No. 15.....	460,116
20 Sesser Coal Co.....	424,449
21 Bell Zoller Mining Co., No. 1.....	423,687
22 Madison Coal Corporation, No. 9.....	423,556
23 St. Paul Coal Co., No. 1.....	413,625
24 Chicago & Centreville Coal Co., A.....	407,420
25 Shoal Creek Coal Co., No. 1.....	407,025

Milwaukee's Coaling Plants

Milwaukee, which has become one of the greatest coal-distributing points on the Upper Lakes, furnishes a conspicuous example of extraordinary efficiency in the line of coal handling. The necessity for taking care of over 5,000,000 tons of coal during a comparatively short season of navigation, calls for the use of the best modern appliances, and in this respect Milwaukee is not outclassed by any port on the inland lakes.

There are 28 coal-receiving plants along the several channels which go to make up Milwaukee Harbor. More than half of these are located in the Menominee Valley, which is the busiest manufacturing center of the city.

ever constructed. It has a clear span of 360 ft. and cantilever extension of 120 ft., and carries a five-ton bucket. At this plant three fast hoists take coal from vessels at the rate of 300 tons per hour each, or a total of 900 tons per hour. The equipment delivers coal into storage at the rate of 600 tons per hour by belt conveyors, and out of storage by bucket conveyors at the rate of 400 tons per hour. The plant was designed to handle 1,500,000 tons of coal over the dock in the course of a season.

At least six of the yards at Milwaukee are equipped to unload cargoes ranging between 5000 and 10,000 tons in the course of 10 hr. An unusual feature of the coal-



COAL DOCK ON THE UPPER MENOMINEE RIVER AT MILWAUKEE

The 28 coal-receiving plants at Milwaukee have a combined storage capacity of something like 4,000,000 tons, while the machinery with which they are equipped represents an unloading capacity of 100,000 tons every 10 hr. and called for an investment of about \$2,000,000. Without exception the various plants are equipped with the very best machinery applicable to existing dock situations, but there are several conspicuous examples of capacity and efficiency which deserve mention.

The 16th St. yard of the Milwaukee-Western Fuel Co. is equipped with two portable eight-ton man-trolley bridges and two portable steel towers, the outfit being capable of unloading 20,000 tons of coal in the space of 10 hr. There is only one larger man-trolley on the upper lakes, a 10-ton bridge at Superior, Wis.

The revolving bridge at the works of the Milwaukee Coke & Gas Co. is said to be the largest gantry crane

handling system is the employment of two river barges which were formerly lake schooners, by the Milwaukee-Western Fuel Co. One of the barges is equipped with elevating machinery by which coal is transferred direct to bins or yards connected with power houses, thus avoiding a vast amount of teaming.

The Youghiogheny & Ohio Coal Co. will soon be in shape to receive coal over its new dock on the South Menominee Canal. The steel hoists are nearing completion and dredges are deepening the canal and slip on which the dock is located. This company contemplates the establishment of another dock on the Kinnickinnic Basin.

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In some boiler houses as much as 4.7 kw. per hr. is allowed per rated boiler horsepower. The tendency to force boilers to a higher steam output is on the increase.—Bromley in "Power."

Who's Who in Coal Mining

Alfred W. Calloway

In all the category of coal-mining men there is no name more suitable to conjure with than that of A. W. Calloway. Production and Calloway are synonymous. Maximum output and Calloway also mean the same thing. Yet he doesn't hurry, nor run, nor fuss, nor yell, but somehow or other lots and lots of coal flows over the tipple.

When most men holding high positions of authority change their place of abode and become identified with



COAL AGE

ALFRED W. CALLOWAY

new activities in an entirely different field, the question is asked, Can they repeat? Meaning, in plain English, Can they handle the new work with as much success as they did the old? However, there are some men whom we take for granted. Much is expected of them in the way of quantity and quality, and they invariably deliver the goods in exact accord with preliminary specifications. Such a man is Mr. Calloway, and no one of his friends doubts but that he will get as much in proportion out of the West Virginia mines he now manages as he did out of the Pennsylvania plants, which were brought to such a high state of efficiency under his direction.

A. W. Calloway was born June 21, 1872, at Manchester, England. He came to America when 10 years of age and entered the public schools of Brooklyn, N. Y.

He graduated from one of the Brooklyn High Schools when he was 16.

This ended Mr. Calloway's school days, and he immediately entered the engineering corps of the Pennsylvania Railroad, remaining in this line of work for the same company during the succeeding five years. Leaving the employ of the Pennsylvania Railroad in 1893, he became identified with the Rochester & Pittsburgh Coal & Iron Co., of Punxsutawney, Penn., his first work being in the operating department. He continued in the service of this corporation for 20 years, winning successive promotions, which finally placed him in the office of the general manager of the company, with headquarters at Indiana, Penn.

During his years of service in Pennsylvania, Mr. Calloway came to be recognized as one of the leading spirits in the bituminous industry of that great coal state. He identified himself with the Coal Mining Institute of America, and after serving as vice-president of that organization in 1910 and 1911, was elected president of the Institute in 1912, resigning in 1913 on account of pressure of other duties. He was appointed to the Bituminous Inspectors' Examining Board of the State of Pennsylvania in March, 1913, for the term of four years, by Governor Tener, and at the first meeting of the board was chosen president.

In December, 1913, Mr. Calloway resigned his position with the Rochester & Pittsburgh Coal & Iron Co., to accept the vice-presidency and general managership of the Davis Coal & Coke Co. In March of this year, Mr. Calloway was elected president of the Davis company, which advancement was due to the quick recognition of his exceptional ability on the part of the West Virginia corporation. Aside from being president of the Davis Coal & Coke Co., he is also president of the Maryland Smokeless Coal Co., and president of the Buxton & Landstreet company.

Alfred Calloway is a modest unassuming man, whose forcefulness, ability and strength of character are indicated by action—never by blatant boasts. He is beloved of his men, respected by his competitors and adversaries. He was married in November, 1893 to Miss Mary Henshey, of Altoona, Penn. They have three children. He is the nearest approach to a one-track man in the matter of occupation that we have ever known. He is familiar with coal mining in all its ramifications, and all his energy is concentrated on his activities in this line. He says that the only important work of a scientific or literary nature he ever did was to sign a subscription blank to COAL AGE.

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[Whenever we have discontinued the short biographical sketches of prominent men, published on this page, inquiries have come in asking why, and readers have requested us to continue the work. It is one of the most popular pages in our paper. Send us the names of men you want us to write a story about.—ED.]

Editorials

Coal and Other Barons

The expression "coal barons" has received an increased fitness from the events in Colorado. The mine owners have, like the feudal lords of olden time, supported their armed men. We do not think that they themselves would declare that such a retinue was other than ominous and unfortunate. Certainly the citizens generally believe it is to be deplored.

But deplored and condemning will serve but little purpose, the main need is for a cure. Such a correction of the ills besetting our social conditions can be assured by legislation similar to that which eliminated castle-building and the maintenance of private armies, which had been necessary during the Middle Ages. Acts of parliament and court orders were of no avail. In fact, these private armies were the only guarantees of order, the forces of the state not having been created.

There can be no act passed which will prevent an apple woman from defending her stock in trade and similarly no act will prevent men from preparing to meet in battle those who propose to destroy their property or invade their inherent rights without title of law.

The change of the barons from a warlike to a peaceful basis was effected by commuting feudal services for a money payment. This made the state rich and strong and able to impress its power on all those under its tutelage. Secondly, a standing army was brought into existence by which rebellion of either barons or people against the state was made futile. Our British ancestry, like ourselves, feared a standing army, but found in it the only safeguard against the existence of private armies, the continued maintenance of which is unthinkable under modern conditions.

When the law was enforced by a power which to every element was overwhelming, the disarmament of all the citizens followed and private guardsmen became unknown. It is because we have been remiss in providing for good order and for the supremacy of the law that the operator, like the applewoman, has had to be on the defensive.

Give both adequate protection, and the needs for defense being removed, the means for self-protection will not be acquired. The mine guards are the sure outcome of a government, weak because of divided counsels, constitutional restrictions and disrespect for legal enactment. The operators have dispensed with guards and arms twice already, each time as soon as the duly constituted authority promised the enforcement of even a part of the law.

They have submitted even to violations of it at the hands of duly constituted authorities in the hope of peace. For example, they have been forbidden by a presidential ukase from bringing in men to replace those who were driven out by the violence of the strikers and to replace men who were killed in their attacks. But so long as orders of the executive are not too obviously unfair and il-

legal, they did not and will not protest, even in the courts provided for that purpose.

A better plan than waiting till civil war exists would be to provide a force always ready to require an obedience to the laws, one which would entirely remove from the operators the necessity of self-defense. A small force of constabulary would assure such a result and Colorado should not have failed at its last legislative session to form such a body.

Nothing but opposition to all order explains the defeat of the constabulary bill. There is such a body, in addition to a standing army, in every country from which those people come who have made so much disorder. Here when trouble occurs, we have for weeks neither constabulary, militia nor standing army, for the first does not exist, the second is not assembled till disorder becomes riot, and the last is only to be obtained when riot becomes open rebellion.

Disorder is in the air—there are riots in Colorado, West Virginia, New York and Pennsylvania. All industrial workers are discontented with their lot, all are bound to form trusts to protect their labor and increase their earnings at the expense of each other. In order that their controversies may always be conducted within the law and lawfully restrained, we need in every state a constabulary as amenable to discipline and as well trained as that in Pennsylvania.

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Occupational Fatigue

Now comes a doctor who asserts that premature old age is brought on our miners by permitting or encouraging them to spend their leisure time in gardening. The extra work after hours is supposed to cause additional fatigue, lessening industrial efficiency and shortening life.

If this be true, and we must choose between old age and our gardens, let us by all means accept the latter and pay the price by living a shorter span of years. However, we think our medical friend is wrong, for the average coal miner is not unlike the workman in any other industry. We all need relaxation, and there is no greater form of beneficial exercise than gardening when it is done for fun and not for business.

All normal men require diversion—that is, something different from our daily grind. The banker and merchant take up golf, the younger men probably baseball or other forms of strenuous athletics. What could be devised to amuse and profit a miner more than a little garden plot, with its flowers and wholesome vegetables? Also, what is better calculated to create self-respect which comes with decent cheerful surroundings?

Anyone who thinks to increase the efficiency of employees by housing them in shanties erected on clay banks, with an outlook on nature neither fit for beast nor man, is following a mistaken policy by planting in men a type of religion not likely to help in the campaign for good fellowship and contentment so necessary to industrial success.

If we have come to a point where miners are worked to such a limit, that they must recline and rest their bodies from the toot of the closing-down whistle in the evening until the first call to work in the morning, then let us change conditions by still further shortening the hours of labor. No occupation should be permitted to claim a man's energy to the total exclusion of all else.

The doctor is quite in error. Our miners are not such absolute slaves to their trade as he would have us believe.

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Concentration of Surface Operations

Some years ago, the man who spread his mine plant over a five- or ten-acre lot, had strong arguments to back his action. He was afraid that a fire, wining out part of his equipment, would spread to other parts and above all he was desirous that no conflagration he might have would fill his mine with unbreathable gases and suffocate the men.

But times have changed. Nowadays we build all our structures of fireproof material and nothing is gained by spreading our plants over all the ground available. If the plant is not fireproof, it should be made so, not only to save insurance losses and to take care of the workmen, but also so that the plant can be concentrated round the shaft mouth with perfect safety.

We recently visited a plant on which much money had been spent. Coal for the boilers was hoisted up the material shaft and dumped into a larry and then hauled electrically on a steel trestle to the boilers, where it was stoked by hand. The coal should not have been brought up that shaft at all, for the boilers ought to have been fired with the waste from the picking table or by slack screened out of the coal about to be shipped.

The larry should have been replaced by a conveyor, which could have been put in operation without any travel or labor. The money saved, by eliminating the trestle and larry, even had the conveying distance been the same, which was unnecessary, would have paid for the conveyor, and made the labor saving clear profit.

As the power house was located a long way from either shaft, the power losses were bound to be considerable, and poorly laid and maintained lines made this defect even more obvious. Moreover, the blacksmith and carpenter shop lay considerably lower than the collar of the main shaft. As a result it was not possible to lay a tram road connecting the shop with the top of that shaft. Consequently, if any car is found defective when dumped, it must either be laid aside on the ground near the main shaft or dropped to the coal bed, transferred to the material shaft, hoisted, and then trammed to the blacksmith shop. Life is all too short for such methods.

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The Clayton Bill

Of all recent legislation, none so vitally concerns the coal industry as the Clayton bill. This law has already passed the House of Representatives and has been referred to the Senate Judiciary Committee. The parts of this bill of especial interest to coal-mining people are as follows:

Sec. 3.—That it shall be unlawful for the owner, operator, or transporter of the product of any mine . . . to refuse arbitrarily to sell such product to a responsible person, firm

or corporation who applies to purchase such product for use, consumption or resale within the United States or any territory thereof . . . and any person violating this section shall be deemed guilty of a misdemeanor.

Sec. 7. That nothing contained in the antitrust laws shall be construed to forbid the existence and operation of fraternal, labor, consumers, agricultural or horticultural organizations, orders or associations instituted for the purposes of mutual help, and not having capital stock or conducted for profit, or to forbid or restrain individual members of such organizations, orders, or associations from carrying out the legitimate objects thereof; nor shall such organizations, or associations, or the members thereof, be held or construed to be illegal combinations or conspiracies in restraint of trade, under the antitrust laws.

Next of interest, and deserving careful study is the proposed law to cover the issuance of injunctions. It reads as follows:

Sec. 18.—That no restraining order or injunction shall be granted by any court of the United States, or a judge or the judges thereof, in any case between an employer and employees, or between employers and employees, or between employees or between persons employed and persons seeking employment, involving, or growing out of, a dispute concerning terms or conditions of employment, unless necessary to prevent irreparable injury to property, or to a property right, of the party making the application, for which injury there is no adequate remedy at law, and such property or property right must be described with particularity in the application which must be in writing and sworn to by the applicant or by his agent or attorney. And no such restraining order or injunction shall prohibit any person or persons from terminating any relation of employment, or from ceasing to perform any work or labor, or from recommending, advising, or persuading others by peaceful means so to do, or from attending at or near a house or place where any person resides or works, or carries on business or happens to be, for the purpose of peacefully obtaining or communicating information, or of peacefully persuading any person to work or to abstain from working; or from ceasing to patronize or to employ any party to such dispute, or from recommending, advising, or persuading others by peaceful means so to do; or from paying or giving to, or withholding from, any person engaged in such dispute, any strike benefits or other moneys or things of value; or from peaceably assembling at any place in a lawful manner, and for lawful purposes; or from doing any act or thing which might lawfully be done in the absence of such dispute by any party thereto; nor shall any of the acts specified in this paragraph be considered or held unlawful.

Another interesting point is contained in Section 20, which provides that in trials for contempt "such trials may be by the court or upon demand of the accused by a jury." Still further in Section 21 it is stated "that the evidence taken upon the trial of any person so accused may be preserved by bills of exception, and any judgment of conviction may be reviewed upon writ of error in all respects as now provided by law in criminal cases; it may be affirmed, reversed or modified as justice may require."

The Senate Judiciary Committee is composed of the following members:

Hon. Chas. A. Culberson, of Texas, Chairman.
 Hon. Lee S. Overman, North Carolina.
 Hon. Wm. E. Chilton, West Virginia.
 Hon. James A. O'Gorman, New York.
 Hon. Duncan U. Fletcher, Florida.
 Hon. James A. Reed, Missouri.
 Hon. Henry F. Ashurst, Arizona.
 Hon. John K. Shields, Tennessee.
 Hon. Thos. A. Walsh, Montana.
 Hon. Hoke Smith, Georgia.
 Hon. C. D. Clark, Wyoming.
 Hon. Wm. P. Dillingham, Vermont.
 Hon. Knute Nelson, Minnesota.
 Hon. George Sutherland, Utah.
 Hon. William E. Borah, Idaho.
 Hon. Frank B. Brandegee, Connecticut.
 Hon. Elihu Root, New York.
 Hon. Albert Cummins, Iowa.

We urge that everyone interested in the questions covered by the Clayton Bill write his views to some of the members of the committee above mentioned.

Extracts from a Superintendent's Diary

To-day I sneaked off to town to witness my first ball game this season. It was not premeditated in the least. Ten minutes before I left the office, I had not even thought of going. I was sitting at my desk brooding over last month's cost sheet, just completed by our district auditor and sent post haste by special messenger, when I overheard a conversation between my office boy and a commissary driver, standing just outside my office:

"H'its sure gwine to be some game, Sam."

That settled it for me. I followed the impulse. In two seconds I was enroute.

I am quite sure that only two seconds elapsed, because I spoke two words; they were addressed to my chief clerk, "Going out."

I enjoyed the game immensely until about the middle of the second inning, then I happened to turn in my seat to follow a foul with my eyes, when, lo and behold, sitting behind me with his gaze intently upon me, I spied our general manager.

Again, I had an impulse; it was to sink through the floor; but the general manager broke the spell before I could execute it. Come back here, Thompson, he said; plenty of elbow room and a better view of the game. I went.

Here a strange thing happened. The general manager and I began to discuss our likes and dislikes and all but forgot to follow the game. His views, as expressed to me, are worth preserving here. I won't attempt to recall his exact words, nor will I worry with quotation marks.

The trouble with most mine superintendents, said he, and, in fact, with all men in authority around coal mines, is that they don't cultivate an avocation; in consequence, they have about as much imagination and humanity as a ship's stoker. I would rather stake my chances, if I were a miner, on a man who sneaked off to the ball park for an occasional hour, than on any fellow who stuck to his job 365 days in every year. I've generally found that the mining man who takes an interest in base-ball, loves to hunt, fish, raise vegetables, tells capital yarns, loves children and books and knows a few things about human beings in general. Just where our men get their idea that we expect them to be grinding away at their job 24 hours in every day in the year, is more than I have ever been able to figure out. Yes, actually when we propose safety-first contests and prize gardens to some of the superintendents, they are at a loss to understand how they can spare the time to do their part.

Undoubtedly, this narrow interest in things in general explains in part why coal-mine officials are so easily out-classed as debaters, when they get into newspaper controversies with the Union officials, during strike periods.

You can't tell me that a narrow-minded official with no points of live contact with the outside world and no actual knowledge of books or history, has any chance of moving the masses or even the classes, no matter how sound his arguments or outraged his cause, if he has to argue against a man who has bled and suffered, even though the suffering has been self-inflicted.

No, sir! We need red-blooded men in command today, who have at least some idea as to where the pulse of the world can be located.

Another American Mine Safety Association Section

With about 50 miners present from Tower Hill Nos. 1 and 2, Thompson Nos. 1 and 2 and Orient and Republic mines, a meeting was held in the first-aid rooms at Republic last evening to organize the Republic section of the American Mine Safety Association. Following are the officers elected: President, W. W. Fleming; vice-president, Ralph Keena; secretary and treasurer, H. C. Millward; executive committee, William Fowler, D. P. Millward, Richard Minerd, Dr. C. C. Ryan, A. Lake and C. J. Carroll.

The next meeting will be held in the Republic first-aid rooms on Friday evening, June 19. At this meeting a first-aid demonstration will be given in charge of H. O. and D. B. Millward. The former has a Slavish first-aid team, while his brother has two companies of young girls who will execute a first-aid drill. A paper will be read by Dr. C. C. Ryan on "The Physician in Relation to First Aid." D. B. Millward will respond on behalf of the miners. The American Mine Safety Association, of which the new organization forms a part, has already charters in 22 states. The Republic section will give an outdoor meet sometime this summer and will be assisted by a government exhibit. D. B. Millward has a large class of first-aid men, women and boys.

Recent Legal Decisions

Eight Thousand Dollars Not Excessive Recovery for Personal Injury—Eight thousand dollars was not excessive recovery for injury to an employee of a fuel company, attributable to negligence of the company, where his right leg was broken and permanently shortened and distorted. (Wisconsin Supreme Court, Janiak vs. Milwaukee Western Fuel Co., 146 Northwestern Reporter 788.)

Injury to Miner Through Falling Roof—A Pennsylvania mine owner is not responsible for injury to a miner for the foreman's failure to provide sufficient props to support a roof at the miner's place of work, unless the mine owner or his representative knew of the mine foreman's omission of duty, or unless the injured miner voluntarily encountered the risk, knowing the danger. (Pennsylvania Supreme Court, Peters vs. Vesta Coal Company, 90 Atlantic Reporter 65.)

When Miner Assumes Risk of Injury—As a general rule, an employee engaged in making an entry in a coal mine assumes the risk of injury arising from the nature of the work as it progresses, and must take customary precautions to avoid injury to himself. But, if he is injured as a result of omitting timbering at the direction of a superior, the employing mining company may be held responsible, if such direction appears to have been negligent. (Iowa Supreme Court, Williams vs. Craig Dawson Coal Co., 146 Northwestern Reporter 735.)

Liability of Initial Carrier of Interstate Shipment—When a railway company receives carload freight under a bill of lading calling for delivery at a point in another state, but on an understanding that the shipments shall be diverted to points beyond on other lines of railroad, at through rates computed from the place of original shipment, the company becomes liable for loss of, or injury to, the shipments on such other lines of railroad, under the provision of the Carmack Amendment to the Interstate Commerce Act which makes an initial carrier of an interstate shipment liable for loss caused by a connecting carrier. (Illinois Supreme Court, Gamble-Robinson Commission Co. vs. Union Pacific Ry. Co., 104 Northeastern Reporter, 666.)

Right to Recover Under Entire Contract—A coke company which agreed, in consideration of its release from a contract to deliver its entire product for six months, to sell enough coke to enable defendants to fill certain contracts, deliveries to be made throughout a period of five months, is not entitled to recover for a partial delivery, having delivered less in the first month than was called for by the new agreement and nothing during the second month. "The present is a case in which the manifest purpose of the agreement would be defeated were it held to be a divisible contract, thereby allowing the plaintiff not simply to disappoint the defendants in what it was intended they should receive for a specific and express purpose, but requiring from the defendants payments for so much performance as met the pleasure, convenience and advantage of the plaintiff." (Pennsylvania Supreme Court, Producers Coke Co. vs. Hillman, 90 Atlantic Reporter 144.)

The Wage-Scale Conference in Ohio

Outside influences are said to be at work to help terminate the Ohio suspension and a hopeful feeling is expressed by many who are familiar with the situation. After the meeting with the miners' officials, Gov. Cox said he felt encouraged with the day's proceedings and hopeful of the outlook. On the other hand, there are other equally expert opinions that there are no prospects for immediate settlement because of the poor absorbing power of the market. They insist that with the Pennsylvania, West Virginia and Kentucky fields operating at 75% capacity and with a demand greatly below normal, the market is being well taken care of.

Miners in the smaller towns throughout the state are said to be feeling the effect of the strike more than ever because the stores are insisting on cash for goods. Recent estimates show that the miners have lost about \$2,000,000 in possible earnings since they quit work and that the operators have lost even more.

Little progress was made Wednesday in the conference. Eastern Ohio operators are still insisting upon a scale of 99.2c. or 41.12c. on the mine-run basis and steadily refuse to consider a higher figure while the miners' officials declare they will not consider such a scale at all. Senator Green, author of the mine-run law and secretary-treasurer of the miners' union, offered a proposition to as-

certain the average percentage of screenings in all districts in Ohio, but this proposition was not looked upon with favor by the eastern Ohio operators.

Coal Mining in Michigan

Michigan participated in the general increase in coal production in 1913, mining 1,231,786 short tons, valued at \$2,455,227, according to figures compiled by E. W. Parker, of the United States Geological Survey, in coöperation with the State Survey. The increase over 1912 was 25,556 tons in quantity and \$55,776 in value. Michigan is an important manufacturing state, particularly in the making of furniture and in the evaporation of salt. The up-to-date character of the state's manufacturing establishments is indicated by the fact that most of them are equipped with mechanical stokers using slack coal that is obtained cheaply from West Virginia and is of better quality than the Michigan product. Michigan slack thus becomes a drug on the market, and the coal mines are obliged to depend almost exclusively on the domestic trade, which requires lump coal. The coal mines were practically free from labor troubles in 1913, a strike of seven men for 180 days being the only one reported.

Approximately 10 to 15 per cent. better evaporation per pound of coal will be obtained in a clean boiler as compared with one in which there is a small deposit of scale. Scale $\frac{1}{16}$ in. in thickness causes a loss of 2 per cent. of the fuel burned; $\frac{1}{32}$ in. in thickness, a loss of 4 per cent. of the fuel, and $\frac{1}{16}$ in., 9 or 10 per cent. loss.



IT ALL DEPENDS ON THE WAY YOU LOOK AT IT

Discussion By Readers

A Longwall Proposition

Letter No. 1—Referring to the inquiry of H. R. Hartsuff, COAL AGE, June 6, p. 944, referring to the adaptation of the longwall method of coal mining to the conditions he has described, I would say that the proposition would not be an encouraging one. While it might be a physical possibility to mine this coal by the longwall method, I do not believe it would be commercially profitable.

My duties, for some time, have concerned the solution of just such problems as that presented by Mr. Hartsuff. In one case, the conditions were very similar to those he has described; and, in that case, we found that entries with short, wide rooms driven off both the entry and the air course were impracticable, insofar as obtaining the maximum recovery of coal, per acre, was concerned; and were by no means profitable, from a commercial standpoint, disregarding the completeness of the recovery of coal.

The chief difficulty lies in the fact that both the roof and the coal have greater crushing strength than the unrestricted fireclay bottom. The short rooms will not open up an area of sufficient breadth to permit of a good fall. (The length of the room does not enter into this consideration.) In the instance referred to by Mr. Hartsuff, I doubt whether he could break the absolute roof of the mine, which he refers to as a "sulphur binder" and the overlying strata. I believe this would be a difficult matter to accomplish even with a hard bottom, having a strength equal to or greater than the top slate.

Whether or not the working of any coal seam will prove to be commercially profitable depends on more factors than the physical conditions. But, aside from this, I believe it to be perfectly practicable to break any roof. In my own experience, I have never met with a condition of coal, including the top and bottom, that could not be handled by some means. In Mr. Hartsuff's case, I would suggest that the problem of overcoming the heaving of the bottom and breaking the absolute roof can probably be solved by reducing the load on each pillar and increasing the bending moment of the roof. Under these conditions, however, what is more important than anything else is to rob the pillars clean and permit no stumps of pillars or timbers to remain in the gob. If these are left, they will prevent a good roof fall, and the weight resting on the pillars will cause the bottom to heave; and result in a squeeze that cannot be controlled.

In order to reduce the load on the pillars, the ratio of width of pillar to width of opening must be increased; and to increase the bending moment of the roof, wider rooms must be driven and longer break lines must be established. These should run at an angle of from 45 to 60 deg. with the center lines of the rooms. It seems scarcely necessary to add that the rooms must be driven of a uniform width and on centers. The requirements of ventilation will probably make it impracticable to increase the width of the pillar sufficiently to resist the tendency of the bottom to heave, unless the width of rooms be like-

wise increased. It would seem practicable to drive the rooms 250 or 300 ft., provided the miners are not required to handle their cars between the face of the room and the entry.

In the instance to which I have referred, our coal was 38 in. thick; and the mine cars were built low so that we did not have to lift bottom in the rooms, but only on the entries. Our rooms were driven 300 ft., with a width of 18 ft., on 65-ft. centers. Pillars were robbed as quickly as the rooms were completed. No more rooms were opened in advance of the robbing than was necessary to maintain a fair tonnage from the entries tributary to the line of robbing. In our case, the roof immediately above the coal was soft and overlaid with a hard sandstone, so that it was necessary to use both cap-pieces and footboards for all timbers. For cap-pieces, we used old car planks sawed 12x18 in.

The double-entry system was employed, the entries being driven at such an angle with the strike of the seam as to give a suitable grade in favor of the loaded cars. The rooms were turned to the rise off one entry only. The mine, in this case, was opened out in the shape of an isosceles triangle, the angles at the base being each 45 deg., and that at the apex or opening, 90 deg. The break line corresponds to the base of the triangle. We experienced the maximum weight when the robbing line had advanced about 350 ft. from the opening. At that time, the cover broke 300 ft. to the surface. Later, breaks in the mine roof occurred at regular intervals; and, at less frequent intervals, breaks extended to the surface.

The coal was mined in a satisfactory manner, the percentage of recovery, per acre, was increased to about 88 per cent., from what was formerly about 50 per cent. This increase in the percentage of coal recovered enabled us to compete successfully with other mines employing more wasteful methods of mining.

A MINE INSPECTOR.

_____, W. Va.

Letter No. 2—In reply to Mr. Hartsuff's inquiry, relating to longwall working, I would suggest that this method could be tried without entailing extra expense, and without making any material change in the present system of mining, at first.

The method I would suggest is as follows: Drive two pairs of entries, say 100 yd. apart, to the boundary line. At the head of these entries, start to turn rooms along the line, drawing back the pillars as quickly as the rooms are finished and proceeding thus to work out all the coal from the boundary toward the old workings. This work should be so conducted that the rooms at the head of the entries will be the first to finish, so that the pillar workings can follow up the rooms, in regular order.

An important feature in this method of working would be to drive all the rooms on centers, for the sake of uniformity; but especially should this be the case in respect to the rooms driven off the two inner entries of each pair, so that these rooms will cut into each other in line.

The rooms being driven 150 ft. deep, this method will give a total line of break equal to the length of four rooms, plus the entry centers, or between 600 and 700 ft., which should cause the "sulphur binder" to break and fall, eventually, when the rooms and pillars have been worked back a sufficient distance from the boundary line.

When this fall occurs, longwall working can be started on the retreating plan, the coal being worked back on the butts. There would be 300 ft. plus the entry centers, of working face, to each pair of entries or roads. The coal can probably be cut by longwall mining machines operated across the face. The mining should be done in the fireclay, to avoid the loss of coal. The longwall face should be protected by four or five rows of posts set according to a systematic method, and, for greater safety, two rows of cribs may be used. These should be set on slack or dirt so that they can be readily removed as the work progresses. All timbers should be recovered and used again. The number of men that could be employed on this face would be determined by local conditions and customs.

This system of mining by longwall will afford the loader an increased earning capacity, as the track is carried along the face on steel ties and moved forward as the work advances. The car is thus always close to the coal to be loaded. It is important to employ a sufficient number of men that the face will retreat rapidly.

This system affords all the advantages of the longwall method of mining. The only possible difficulty that could arise would occur in the event of a break closing the longwall face. This, however, is not likely to take place, as I believe the conditions described by Mr. Hartsuff are favorable for such a method of working. The first break would give the roof strata a free end, after which the action of the overburden could be controlled by cribs and posts, as the great weight would naturally settle on the gob, in the rear of the working face.

Should the adoption of this longwall method of working prove successful in Mr. Hartsuff's case, it would not be necessary to continue work longer in the rooms. More entries could be driven to the line and the work brought back in the manner described. No packwalls will be required in this system of mining. The expense for yardage, in driving the entries, will not be as great as shooting down the roof, building the necessary packwalls and keeping open roads, as required in the regular longwall system. All the roads here are in the solid coal, and will require little or no upkeep.

JOHN CRAWFORD,
Foreman, Mine No. 1,
The Pittsburgh-Belmont Coal Co.

Steel, Ohio.

Letter No. 3—I believe the conditions described by Mr. Hartsuff, COAL AGE, June 6, p. 944, are favorable for employing the longwall method of mining. The roof slate, which he states can be shot down, will form good material for the packs; and if these are properly built and kept in good shape, all squeezes can be controlled.

As the "sulphur binder" is strong, it will allow a large area of coal to be taken out before the roof starts to settle. By that time, the packs will have become quite solid, owing to the roof slate drawing away from the rock and settling down on the packwalls. This will form more or less of a cushion over the packs to receive the

great weight of the overburden when the first break occurs.

By that time, however, another cross-road will have been started at the coal face, which will cut off the other lengthening roads in which the tracking can then be pulled and used again. It is important to draw all timber when building the packs. With reference to the cost of the work, much will depend on the class of labor employed. The men must understand how to build good uniform packs so as to make them solid, as the success of the method depends largely on the character of the packwalls.

The entire work must be in the charge of an experienced miner who has a thorough knowledge of longwall methods. Good packing means good ventilation. The mine foreman must outline the work and mark where the packs are needed. The work of building these packs is performed mostly by night men. The slate is drilled in the day time and blasted down between shifts, ready for the night men to stow away. It will be sufficient to carry a 12-ft. pack on each side of the roads, which should be turned every 60 ft. The coal face should be "staggered," by which I mean one place should be about 30 ft. ahead of the other. New crossroads should be started every 200 yd., so as to cut out the old territory or worked-out area.

If longwall work is properly conducted, 100 per cent. of the coal can be extracted. This feature alone is a great advantage and goes a long way toward reducing the cost of production. If Mr. Hartsuff will work one portion of the mine on the room-and-pillar system and operate the other on the longwall system, and compare the cost of the two, he will undoubtedly find that the longwall method will prove the best system to adopt.

JACOB RILEY.

Universal, Ind.

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The "Safety-First" Call

Letter No. 1—Referring to the "Safety-First" campaign, so often mentioned in COAL AGE, a short time ago certain West Virginia coal operators appointed "safety inspectors" for service in their mines. The sole duty of these inspectors, as stated, was to assist the mine foreman in regard to everything relating to the safety of the employees and the mine.

The operators, at that time, addressed a letter to the chief of the Department of Mines in West Virginia, Earl A. Henry, acquainting him with their action. Co-operating with them, Mr. Henry, at once, mailed a copy of the letter he had received to every coal operator in the state, in an effort to interest them in similar measures.

In contrast with this safety movement in West Virginia, compare the recent action of 400 miners employed by the J. R. Crowe Coal Co., at their mines Nos. 19 and 20, at Seaman and West Mineral, Kan., who are reported to have "walked out," stating that they would not return to work until the danger signs that had been posted by Gen. Supt. R. A. Gray, in and about the mines, had been removed. The men claimed that they could take care of themselves without such reminders of danger.

These two examples, though not typical, serve to illustrate the relative importance placed on the "Safety-First" movement by some operators and miners. Not all operators go to the same length or take the same interest as

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those in West Virginia and Supt. Crowe in Kansas. Neither do all miners go to the same length as those employed by the J. R. Crowe Coal Co. to which we have referred. On the whole, miners as a class, manifest greater indifference to the "Safety-First" campaign than would naturally be expected since it is chiefly in their interest that the work is being pushed.

The extra expense entailed in the effort to secure greater safety in the mine falls wholly on the operators, not a cent being taken from the miners. While it is true that the operators are repaid, to an extent, for this expenditure, by a reduction of the accident list, lawsuits, damages and payments to the Workmen's Compensation Fund, the movement for greater safety does not emanate purely from selfish motives, and the benefits to the miner far exceed in value those derived therefrom by the operator. Who can place a value on a human life? Miners would do well to remember this.

In view of these facts, it is strange that miners as a whole do not take a greater interest in this campaign for safety. While there are many points on which operators and miners will continue to disagree, the safety campaign certainly affords an opportunity for their earnest coöperation. The effort to secure greater safety in mines should appear to all labor leaders, who should take active steps to enlist the rank and file of the miners in

the movement. Instead of labor agitators devoting their time and energies to discover points that will arouse dissatisfaction among the workers, if these men would devote a few remarks to the interest of safety in the mines, their services would be more effective and better appreciated by those whom they attempt to serve.

The fact that little space is given to promulgate the safety movement, in labor papers, and the limited efforts put forth by labor organizations to secure the same end, all reflect on the attitude of these workers toward the demand for the hearty coöperation of all parties engaged in the work of mining coal. Miners should apply the official motto of their organization to their own attitude in relation to their employers—the coal operators. This motto "United we stand; divided we fall" if applied and made to include the entire coal industry—operators and miners—would produce an untold effect. Present conditions in the mining world are demonstrating the truth that the "get-together spirit" is the highway to increased efficiency and increased earnings.

The "Safety-First" campaign is not a dream but a practical, worthy attempt. The goal, however, can only be reached when all unite in a consistent effort to further the work.

GEO. N. LANTZ.

New Straitsville, Ohio.

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Study Course in Coal Mining

By J. T. BEARD

The Coal Age Pocket Book

Basal Formulas—There are, in fact, but two truly basal formulas, in mine ventilation; the one expressing the **resistance** that an airway offers to the passage of an air current having a certain velocity; the other expressing the **power on the air** producing a certain velocity in an airway, against a certain resistance. These formulas, which have been previously explained, are as follows:

$$\text{Resistance of airway, } R = pa = ksv^2$$

$$\text{Power on the air, } u = pav = ksv^3$$

From these two simple formulas as a basis, with the aid of a few other recognized formulas and principles for determining the quantity, horsepower, water gage, rubbing surface, etc., all the numerous formulas of mine ventilation are derived.

An Important Principle—One of the most important principles of mine ventilation may be stated briefly as follows:

Every airway or mine possesses a certain definite **resisting power**, which is determined by the ratio of its area of passage to rubbing surface. For this reason, a given power will produce a certain velocity and develop a certain resistance, in a given airway; the velocity of the air current varying inversely as the resistance. **Ventilating pressure** is caused by and equal to the resistance developed. **Power**, then, creates **velocity**, which in the airway develops **resistance**; and the resistance produces **pressure**.

The conclusion is, therefore, evident that it is the resisting power of a mine or airway that determines the velocity and pressure a given power will produce in that airway. The airway, it is clear only possesses this resisting power potentially, its development requiring the passage of an air current. Hence, it is proper to term such resisting power, expressed in terms of the airway, the "potential of the airway" or the "mine potential" in respect to a mine.

As has been explained, the equivalent of the mine potential, expressed in terms of the power, quantity or pressure, is properly called the "potential of the circulation."

Illustration of Formulas—To illustrate the use of formulas in mine ventilation, and to make clear their application, the following table is given, in which most of the formulas in common use are classified under their proper heads. Many of these formulas, as will be observed, are simple transpositions of another formula or obtained by substitution. The calculations, in the table, all refer to an airway 5x10 ft. in cross-section and 4000 ft. long, passing an air current of, say 25,000 cu.ft. per min.

The Airway

Perimeter,	$o = 2(5 + 10) = 30 \text{ ft.}$
Length,	$l = 4000 \text{ ft.}$
Rubbing surface,	$s = lo = 4000 \times 30 = 120,000 \text{ sq.ft.}$
Sectional area,	$a = 5 \times 10 = 50 \text{ sq.ft.}$
Potential of airway or mine, $X = \frac{a}{V^2 k_s} \quad X = \frac{50}{V^2 0.0000002 \times 120,000} = 373.4$	

The Coal Age Pocket Book

The Air Current

Velocity,	$v = \frac{q}{a}$	$v = \frac{25,000}{50} = 500 \text{ ft. per min.}$
	$v = \sqrt{\frac{p a}{k s}}$	$v = \sqrt{\frac{12 \times 50}{0.0000002 \times 120,000}} = 500 \text{ ft. per min.}$
	$v = \sqrt[3]{\frac{u}{k s}}$	$v = \sqrt[3]{\frac{300,000}{0.0000002 \times 120,000}} = 500 \text{ ft. per min.}$
	$v = \frac{u}{p a}$	$v = \frac{300,000}{12 \times 50} = 500 \text{ ft. per min.}$
Potential of circulation,	$X = \frac{q}{V^2 u}$	$X = \frac{25,000}{V^2 300,000} = 373.4$
	$X = \sqrt[3]{\frac{q^2}{p}}$	$X = \sqrt[3]{\frac{25,000^2}{12}} = 373.4$
Quantity,	$q = av$	$q = 50 \times 500 = 25,000 \text{ cu.ft. per min.}$
	$q = a \sqrt{\frac{p a}{k s}}$	$q = 50 \sqrt{\frac{12 \times 50}{0.0000002 \times 120,000}} = 25,000 \text{ cu.ft. per min.}$
	$q = a \sqrt[3]{\frac{u}{k s}}$	$q = 50 \sqrt[3]{\frac{300,000}{0.0000002 \times 120,000}} = 25,000 \text{ cu.ft. per min.}$
	$q = \frac{u}{p}$	$q = \frac{300,000}{12} = 25,000 \text{ cu.ft. per min.}$
	$q = X \sqrt[3]{u}$	$q = 373.4 \sqrt[3]{\frac{300,000}{12}} = 25,000 \text{ cu.ft. per min.}$
	$q = X \sqrt{X p}$	$q = 373.4 \sqrt[3]{\frac{373.4 \times 12}{12}} = 25,000 \text{ cu.ft. per min.}$
Pressure,	$p = \frac{k s v^2}{a}$	$p = \frac{0.0000002 \times 120,000 \times 500^2}{50} = 12 \text{ lb. per sq.ft.}$
	$p = \frac{k s q^3}{a^3}$	$p = \frac{0.0000002 \times 120,000 \times 25,000^3}{50^3} = 12 \text{ lb. per sq.ft.}$
	$p = \frac{u}{q}$	$p = \frac{300,000}{25,000} = 12 \text{ lb. per sq.ft.}$
	$p = \frac{q^2}{X^3}$	$p = \frac{25,000^2}{373.4^3} = 12 \text{ lb. per sq.ft.}$
Resistance,	$p = 5.2 \text{ w.g.}$	$p = 5.2 \times 2.3 = \text{say } 12 \text{ lb. per sq.ft.}$
	$R = pa$	$R = 12 \times 50 = 600 \text{ lb.}$
	$R = k s v^2$	$R = 0.0000002 \times 120,000 \times 500^2 = 600 \text{ lb.}$
	$R = \frac{u}{v}$	$R = \frac{300,000}{500} = 600 \text{ lb.}$

Inquiries of General Interest

Cubic Contents of a Bushel of Coal

Kindly state the number of cubic inches contained in a bushel of coal, assuming 80 lb. per bu., for loose coal.

J. S. WATSON.

Baxter, W. Va.

The cubic capacity of the standard U. S. bushel is 2150.42 cu.in. The weight of this volume of water is 62.5 \times 2150.42 \div 1728 = 77.7 lb. Taking the average specific gravity of bituminous coal as 1.3, the weight of this volume of solid bituminous coal would be 77.7 \times 1.3 = say 101 lb.

The legal weight of 80 lb. per bu. of coal in West Virginia, Ohio, Indiana, Illinois, Iowa, Colorado, and other states, allows only 20 per cent. for voids in the loose coal, while the legal weight of 76 lb. per bu. for bituminous coal in Pennsylvania, Kentucky and Montana, allows practically 25 per cent. for voids in the loose coal. These data evidently refer to a well shaken bushel, as the allowance for voids commonly ranges from 30 to 35 per cent.

✉

Cleaning Safety Lamp Gauzes

Will you kindly suggest the best method of cleaning safety-lamp gauzes, so as to expedite the work, save time and obtain the best results. The usual method of cleaning the gauzes of a large number of safety lamps, especially where two gauzes are used in each lamp, consumes much time and is often imperfectly done. Without a close inspection of each gauze, it is difficult to detect when this work has been slighted.

Aside from the use of the common handbrush, which we are employing at the present time, is there any other cheap and convenient method of doing this work effectively and avoiding the necessity of installing a special machine for that purpose?

INQUIRER.

Johnstown, Penn.

Some time since, a correspondent stated that the best way to clean a safety-lamp gauze was to hold it before a comparatively strong steam jet until perfectly clean; then dry before an air blast or in a drying chamber through which a current of warm air is passing.

✉

Two Questions of Safety

There are two questions I would like to ask, in COAL AGE, that affect to a greater or less extent the safety of mine operations.

1. The coal in our mine is all undercut with chain machines, at night. The first thing in the morning, the machine cuttings or slack is loaded out from probably fifty working places. This is done and the places sprinkled, before any shots are fired. I have always thought that the dust raised by from 30 to 50 miners loading this fine slack ("bug dust" as they call it), at the same time, floated in the air and produced a dangerous condition before firing. Is this the case?

2. Is it considered a good plan to carry a part of the intake current through some old workings, before conducting it to the working places? The present arrangement could be changed so as to ventilate the old places with the return air current, which I think, would be safer and better.

MINE FOREMAN.

✉, W. VA.

In answer to the first question, there can be no doubt but that the loading of the fine dust produced by the cutting machines, a short time before firing shots throughout the mine, is a dangerous practice and should be discontinued. Some arrangement should be made by which this dust could be loaded out during the night, so that three or four hours will elapse before shots are fired in the mine. The working places should then be thoroughly sprinkled for a distance back from the face, before shots are fired.

In answer to the second question, it is always a bad plan to permit the intake air current or any portion of it to circulate through abandoned workings, before reaching the working face. The ideal plan of mine ventilation is to conduct the intake current along the main roads or air courses to the farthest point inby, as far as practicable, and then cause it to return along the working face. All abandoned workings should either be ventilated by a separate "scale" of air, if this can be spared from the general circulation at the face; or the return air current should be made to circulate through the abandoned places, on its way out of the mine.

Engineer of Mines

Referring to the inquiry relating to the title "Engineer of Mines," COAL AGE, May 9, p. 784, and the answer there given, I want to ask, If a man has had seven years' experience in mines of different kinds and has completed the mining engineering course contained in 14 volumes of the International Correspondence Schools of Scranton, Penn. and holds their diploma for finishing that course, is he entitled to write the letters, E. M., (engineer of mines) after his name? I would like to learn the opinion of reputable mining engineers on this subject. My question has reference only to the title, "Engineer of Mines," and not "Mining Engineer."

RALPH W. MAYER.

Roslyn, Wash.

As principal of the school of mines to which correspondent has referred, for a period of 16 years, this question often came to me from students who had completed their course; but then, as now, I was compelled to reply that the school was not authorized to give the degree, "Engineer of Mines," and, therefore, while students who completed the course in mining engineering as given by that school, were practical mining engineers and could rightly so style themselves, they could not properly use the letters, E. M., which refer to a degree the school could not give. See, also, COAL AGE, May 9, p. 784.

Examination Questions

Pennsylvania Bituminous and Anthracite Examinations

(BITUMINOUS QUESTIONS, MAY 5-6, 1914)

Ques. 10—What information would you enter, in your daily report, to comply with the bituminous mine law?

Ans.—Art. 4, Sec. 18, requires the mine foreman to enter each day, in a book provided for that purpose, and to sign with ink a report of the condition of the mine, stating any danger he may have observed during the day or that has been reported to him; besides stating whether or not there is a proper supply of material on hand for the safe working of the mine, and whether or not the requirements of the law are compiled with.

Ques. 11—What are the legal duties of a shotfirer and what instructions should he be given?

Ans.—Art. 4, Sec. 14, makes it the duty of a shotfirer employed in a mine generating explosive gas in quantities sufficient to be detected by an approved safety lamp, to charge, tamp and fire all holes properly placed by miners, and to refuse to charge any holes not properly placed. The shotfirer shall use none but incombustible material for tamping, which must be provided by the mine foreman at convenient places inside the mine. All such holes shall be fired by an electric apparatus.

Each shotfirer shall keep a record and report to the mine foreman every hole he has refused to charge, every blownout shot and every hole that has misfired. Every shotfirer or miner permitted to fire his own shot must fire, before leaving the mine, to see that no fire or other visit and examine the place where such shots have been danger is present. No shotfirer shall fire a shot in a place where he can detect explosive gas with his safety lamp; and, in gaseous and dusty mines where locked safety lamps are employed, no holes shall be fired in entries and rooms that have not been thoroughly wetted for a distance not less than 80 ft. back from the hole to be fired.

Ques. 12—The water gage reads 2 in., the velocity of the air current is 500 ft. per min., and the length of air course is 4000 ft.; what would the water gage read if the length of this air course be extended to 8000 ft., and the velocity of the air current be increased to 800 ft. per min.?

Ans.—Both the pressure and water gage vary as the length of the airway and the square of the velocity of the air current. In other words, the water-gage ratio is equal to the length ratio, times the square of the velocity ratio, which gives, in this case,

$$\frac{w.g.}{2} = \frac{8000}{4000} \left(\frac{800}{500} \right)^2 = \frac{2}{1} \left(\frac{8}{5} \right)^2 = \frac{2 \times 64}{25} = 5.1 \text{ in.}$$

Ques. 13—If a workman had his leg broken or had arteries severed, what would be your method of rendering first aid to him, in both cases?

Ans.—Handle carefully, place in as comfortable a position as possible, with soft coal or cushion under fractured limb. Use a cushioned splint and apply a bandage

to hold the limb firmly and prevent the broken bones from moving one against another, being careful not to bandage too tightly.

If arteries are severed, press the wound tightly to stop or diminish the flow of blood, using a handkerchief or cotton over the fingers to prevent getting dirt into the wound. As quickly as possible, apply a tourniquet over the artery between the wound and the heart.

(ANTHRACTITE QUESTIONS, MAY 17-20, 1914)

Ques. 13—Describe fully your method of examining a mine for firedamp, beginning with your preparation before entering the mine; and explain each step taken until the examination is completed and report made to proper officials.

Ans.—Properly clean, fill, trim, examine and adjust the safety lamp to be used in the examination of the mine. Before descending the shaft, observe the operation of the ventilating fan, and note whether it is running at its usual speed. Then, place a suitable danger signal at the entrance as a warning for men not to enter the mine. Proceeding at once to the foot of the downcast shaft or intake opening, note whether the usual quantity of air is passing into the mine.

Following the intake air current, proceed to examine, in turn, all airways, rooms and other working places, to ascertain the possible presence of gas in dangerous quantities, taking note also of the condition of the roof and coal face in each working place. Where gas or other danger is found, fence off the entrances to the place and mark the same with the usual danger sign. In this manner, proceed throughout the section of the mine to be examined, and, on completing the work, return at once to the shaft or slope bottom and enter the report of the examination in the book kept for that purpose. If the mine is in safe condition for the men to enter and proceed to work, remove the danger signal from the entrance to the mine and report to the mine foreman that all is safe for the men to enter, except the places where you have found any danger. The checks of the men working in these places should be removed from the board so as to prevent them from entering the mine.

Ques. 14—What device would you use to remove gas from holes and cavities in the roof of gangways or breasts?

Ans.—It is often necessary, in such cases, to erect a special brattice of canvas that will deflect the air current into the cavity in the roof and sweep out the gas. It is not a safe operation to attempt to brush the gas out of such a cavity with a piece of canvas.

Ques. 16—What quantity of air is passing through an airway 7 ft. 4 in. high, 11 ft. 9 in. wide, when the velocity of the air current is 434 ft. per min.?

Ans.—The sectional area of this airway is $7\frac{1}{2} \times 11\frac{3}{4} = 86\frac{1}{6}$ sq.ft. Assuming the given reading is an average reading for this cross-section, the quantity of air in circulation is $86\frac{1}{6} \times 434 = 37,396$, say 37,400 cu.ft. per min.

Coal and Coke News

Washington, D. C.

In a speech before the National Gas Association of America at St. Louis, which has just been made public here, Joseph A. Holmes, Chief of the Bureau of Mines, again emphasizes the necessity for a careful use of natural resources.

Mr. Holmes, who believes that conservation of these resources is one of the most important problems confronting the people of the country today, said,

I am not interested in any way in that sort of conservation which looks toward the locking up of the natural resources of the country for the future when we need those resources ourselves during the present generation. I think we will all agree as a practical doctrine of conservation, that while we have a right to use everything we need at the present time, we have no right to waste unnecessarily what is the heritage of generations yet to come.

It is hard, I find, to get people to realize the importance of conserving our natural resources under this principle, especially in view of the fact that we have a new, and to some extent, undeveloped country, but in talking with people from the older countries like Great Britain where they have operated industries for a thousand years as compared with our one hundred years, I find that they realize what a thousand years means and they realize how the resources which they are now using at so rapid a rate will, in a few hundred years, be practically exhausted and that when those resources are exhausted it means almost annihilation for any country situated as Great Britain is, and which is so entirely dependent for its commercial success upon the development of its various mineral resources with which it has been so generously blessed.

And when we realize the importance of preventing waste of mineral resources, drawing our information from the experience of the older countries, it makes us more serious in dealing with this important problem in this country.

In the last few decades, we have become a great manufacturing and industrial nation. In the earlier years of our history we were an agricultural people, but when you look at our production of coal, which is becoming more and more an index of the great industrial progress of the nation, it makes us realize pointedly the importance of conservation in view of increased demand, for you will find that during the past 100 years—it was just about 100 years ago that we began to use coal in the United States—we have doubled our consumption of fuel every decade. In other words, from 1900 to 1910 we used almost as much coal as we had used during the 75 years preceding.

When you say that to a man he is apt to reply, "Of course that cannot keep up indefinitely," but why may not the consumption of coal increase enormously? We used 30 years ago about one ton of coal per capita. During the past year we used nearly six tons of coal per capita.

More and more we are becoming a labor-saving country; more and more we are becoming a manufacturing country; more and more we are becoming a country of transportation; and all our industries depend upon the utilization of our natural fuels.

My opinion is that replacement of fuels by water power is going to be somewhat like the replacement of the street transportation facilities of a great city like New York by subways and elevated roads. You may remember when the construction of elevated roads in New York City was proposed people said that these roads would destroy the surface lines, but they are crowded; and when the subways were projected they were to accommodate everybody, and yet the surface cars are just as crowded now as they were before the elevated or the subways were used.

I don't believe we will ever notice a difference in our consumption of coal or natural gas—except locally—through the development of our water power, for that will be an incident, not a big factor, in the future development of this country. These great resources with which nature has provided us are resources which we ought to use wisely and by using wisely I mean that they should be used with common sense, with rigid economy and without any unnecessary waste.

Would Settle Colorado's Difficulty

Representative Keating has introduced the following resolution in the House:

That the President of the United States is hereby directed to appoint a commission of five persons, distinguished in experience, discretion and integrity, and free from any interest in the disputed questions, to invite the coal operators and coal miners of the State of Colorado to immediately submit the questions in controversy to said commission for settlement. Said commission shall inquire into, consider, and pass upon the questions in controversy, and, if submitted, settle the same upon a just and permanent basis, with a view to preventing the recurrence of such difficulties in the future, and in any contingency make a full report of the facts and their conclusions to Congress at the earliest practicable date, and not later than Dec. 1, 1914.

HARRISBURG, PENN.

When the Public Service Commission meets again, the members will have before them the books presenting arguments in the case brought against the anthracite carriers for the purpose of obtaining a reduction in the rates for

transportation of hard coal from the mines in the state to Philadelphia. After due consideration is given the arguments the decision will be rendered.

Since this case was heard the Supreme Court of the United States has rendered an important decision which may have some effect upon the opinion of the Commissioners. The traffic in the anthracite case is known as intrastate traffic, because it is wholly within the state of Pennsylvania, originating at the mines in this state and having a destination which is also within this state. It is thought by some of the Commissioners that the Shreveport decision of the United States Court would not have any bearing upon the anthracite case.

Anthracite shipped to Philadelphia for consumption in that city and vicinity may be regarded as wholly independent of interstate traffic, but shipments made to this port for transportation "beyond the capes" as the trade expresses it when anthracite is destined to New England, would probably fall within the scope of the Interstate Commerce Commissions jurisdiction whose orders would in such cases be paramount to those of the State Commission. The Shreveport case gives an entirely new aspect to the anthracite case and consideration must be given by the State Commission when rendering its opinion.

Briefs on the case to test the constitutionality of the anthracite coal tax are now being prepared by attorneys for both the coal operators and the state. They will be filed shortly, meanwhile the Auditor General is marking time on collections.

PENNSYLVANIA

Anthracite

Mt. Carmel—Three men were caught in an explosion of gas at the Sioux colliery on June 8, resulting in the death of one man, while the others were severely injured. The men fired an unusually heavy charge of explosive, which ignited the gas.

Pittston—The families of Edward Delaney and Jacob Serma at Port Griffith had an unusual experience early on the morning of June 8. The two houses in which the families lived dropped into a mine cave almost up to the second stories. All were gotten out however from the wrecked dwellings.

Pottsville—The mine foremen's Examining Board in the 19th Anthracite District on June 13, announced that 81 candidates successfully passed the examination for mine foremen and assistants. The validity of the papers of several of the successful candidates will be tested in Court by the United Mine Workers of America who assert that only practical miners should be allowed to become mine foremen, and that the examination should not be open to all classes of employees around the collieries.

North Scranton—On June 12, lightning struck the shaft tower at Cayuga colliery of the Delaware, Lackawanna & Western R.R. Co., breaking off a section of the wood-work, disarranging the electric wires and interfering with the hoisting apparatus. For a time it was believed the entire electrical appliances of the mine were destroyed.

Wyoming—Because several of the workmen employed at the Westmoreland colliery of the Lehigh Valley Coal Co., failed to have their union dues paid up to date, 400 men, the entire force went on strike on June 10. The strike is contrary to the agreement entered into by the operators and miners and union officials are endeavoring to make it short-lived.

Sugar Notch—Officials at No. 9 colliery, Lehigh & Wilkes-Barre Coal Co. which was forced to shut down June 10, as a result of the workings being flooded from a pond running into a part of the mines though a 100 ft. cave, expressed fear that the colliery will not resume operations for at least two weeks. The efforts to block up the cave in the bottom of the pond with bales of hay, stumps of trees and other débris were of little avail. Much damage was done by the water, as the dirt is washed from beneath the tracks and a large quantity of mud is deposited in the gangways.

Bituminous

Pittsburgh—The adjustment of the wage scale in the Pittsburgh district resulted in many of the 40,000 miners returning to work under a contract that is to be in force for

two years. Machine men are to be paid 69c. per ton; pick miners, \$1 per ton, and each miner is to be provided with an electric safety cap lamp.

Connellsburg—The coke trade appears to have settled down to a 50 per cent. basis for the summer. The shutting down of furnace ovens in this region has ceased for the present, and it is hoped no further curtailment will be necessary. Merchant plants are making better time. More than half of them are working their active ovens six days per week, while the remainder will average between four and five.

Rockwood—The Mountain Smokeless Coal Co. at Casselman which has been closed down for several months will again resume operations in the near future.

Washington—Three men were killed in the mine of the Meadowland Coal Co. near here June 12. They were all caught under a single fall of slate.

Lynn Station—The sale of the Cyrilla No. 5 plant of the Sunshine Coal & Coke Co. was postponed on June 12 to June 26. The sale was started at Cyrilla at 1 o'clock; the first bid being \$250,000, and the highest \$350,000. The latter was thought to be insufficient by the trustees and the sale was postponed until the above mentioned date.

Evans Station—The Evans Coal & Coke Co. which has been running three days a week for some time past is now operating on full time, and giving steady employment to about 200 men. The production is about 800 tons per day, and the demand promises to continue sufficiently good to keep up steady work for a considerable length of time.

WEST VIRGINIA

Charleston—A liberal estimate places the number of men now idle in the Charleston district at 5325, although about 12,000 quit when the strike was called June 1. It is further estimated that the loss to the miners in wages amounts to \$266,250 per month while the strike lasts. A number of operators in the district have, however, signed up with the Union.

Lookout—George Wills and Samuel Cook were killed, and Lawrence Wills and Samuel Flint were probably fatally injured recently when an electric locomotive crashed into the tipple of the Blume Coal Co. The men were thrown from the tipple into a deep ravine.

Colliers—The strike of the miners at the West Virginia and Pittsburgh Coal Co. was declared off June 12, following the announcement of leaders of the miners that they would waive demand for recognition of the Union. It was unofficially stated that the company had granted the eight-hour day, the wage of the United Mine Workers of America in the Pittsburgh district, and given the miners the protection of the Insurance Department of the West Virginia Public Service Commission.

Moundsville—During a severe thunder storm, recently lightning struck the powder house at the Rail & River mine No. 3 at Big Run, destroying 2000 dynamite caps but not injuring 1500 pounds of dynamite that were stored near them in the same building.

Bluefield—It is understood that the Sandy Ridge Coal & Coke Co. has decided to increase its holdings on Lewis Creek, and plans are being made for opening one or more mines in the near future.

KENTUCKY

Lexington—Contracts have been made by three of the southeastern Kentucky coal companies by which they will receive the electrical power for operating machinery at their mines from the Kentucky Utilities Co., with headquarters in Lexington. The mining companies concerned are the Wallings Creek Coal Co., the Clover Fork Coal Co. and the Harlan Coal Mining Co. These concerns have been manufacturing their own power, but before the end of the summer will cease to do so and receive the current direct from the central station along the transmission line which the Utilities company is building into that section. Other similar business will likely come to the Utilities company, which is steadily increasing its operations in the eastern and central part of the state.

Whitesburg—Development undertakings are to be begun soon by the Mineral Development Co., owning large boundaries of fine coal lands in Letcher County along the L. & E. R.R. Numbers of announcements have been made as to the plans of the company, but actual work has not been started.

OHIO

Hartford City—The signing of a three-year working contract between the coal operators and the thousand or more men employed in the Pomeroy Bend coalfield has been re-

ported. The miners are granted the check-off and a number of other concessions not heretofore enjoyed.

Columbus—The application for an injunction by Ohio operators to prevent the anti-screen law from being enforced was denied by the Supreme Court of the United States June 15, which finally settled the question of the constitutionality of this law. No further action on the part of Ohio operators is contemplated.

It is estimated that the cost of changing tipples in Ohio to conform to the new anti-screen law will mean an outlay of about \$2,000,000. None of this work has been started as yet.

INDIANA

Sullivan—The shops and offices of the Consolidated Indiana Coal Co. are being moved from Hymera, Ind., to this city, to a site given by the Sullivan Boosters Club. The plant has been at Hymera for 10 years.

Linton—The Froschner Coal Co. has opened a new striping plant six miles north of this city.

Brazil—Six men recently narrowly escaped asphyxiation in the mine of the Brazil Colliery Co. near Billtown. The men failed to come to the top when their shift was completed, and a searching party of miners found them lying on the bottom of the mine unconscious from inhaling gas. They were quickly taken to the top, and soon revived. It is thought that the accident was due to the men being late in firing their shots, as the other miners had discharged their shots and the smoke and gas accumulated to such an extent that the men were overcome before they could reach fresh air.

ILLINOIS

Belleville—The Kolb Coal Co., of Mascoutah, has filed, in the recorder's office here, an increase in stock from \$6000 to \$20,000.

Trenton—The last Trenton coal has been mined, and the name will be but a memory in coal-trade circles hereafter. The Breese-Trenton Mining Co. found the producing cost too high to finish out the small unworked acreage, and has abandoned and dismantled the mine. This mine was sunk about 12 years ago on the last section containing Trenton coal. During the past winter the daily output was 800 tons. The regular summer price for the screened sizes of this coal was \$1.75, and the winter price about \$2—the highest priced coal in the inner district.

Danville—The Bunsen Coal Co. has effected an agreement with its miners for the ensuing two-year period.

Hillary—Work, probably not steady but somewhat over half time, will soon begin in this district again. It is understood that as soon as proper arrangements can be made, the mines will work from three to five days each week, some perhaps doing even better than this.

Canton—According to reports, the new Gilchrist mine No. 6 of the Alden Colliery Co. has been closed down indefinitely. Operations will be resumed, it is understood, as soon as the busy season opens in the late summer or early fall.

Springfield—Out of 96 applicants for mine managers, first and second grade, mine examiners, and hoisting engineers, examined by the State Mining Board at the last examination, April 20, fifty-eight have been given certificates of competency. The details of the list are as follows: Mine Managers, first class, examined, 39; passed 21; Mine Managers, second class, examined 10; passed 10; Mine Examiners, examined 26; passed 16; Hoisting Engineers, examined 21; passed 11. Total number of men examined 96; total number passed 58.

MISSOURI

Kansas City—The interstate field meet proposed for Kansas City is now a certainty, though the exact date has not yet been fixed. The five state tournaments held in Iowa, Missouri, Kansas, Arkansas and Oklahoma were successes in each instance and interest in safety-first and rescue work is at a high pitch. H. D. Ryan, of the Bureau of Mines, is in charge of the plans for the interstate meet, which will probably take place in September. The last of the state competitions took place at Pittsburgh, Kan., on June 13.

MONTANA

Red Lodge—State Coal Mine Inspector, John Sanderson, reports that all of the eight applicants for positions as mine foremen and fire bosses who took the examination for the state certificate recently passed with high marks. The percentage of 75 is required to obtain a certificate. Every applicant turned in papers that came above 80; the majority of them over 90. Carl B. Cheek of Washoe turned in the best paper, receiving 99 per cent.

ARKANSAS

Heber Springs—A bed of anthracite was discovered in court square by blasters who were working on a well, on June 8. The vein, 4 ft. thick, was struck at a depth of 36 ft. Another measure is separated by a layer of soil. The anthracite is believed to be of a high grade.

PERSONALS

Otis Mouser has been elected Vice-President of the Stonega Coke & Coal Co., in charge of sales and traffic matters.

E. J. Prescott has resigned as Comptroller of the Interstate Railroad Co., and has been elected Vice-President of the Virginia Coal & Iron Co.

Governor Dunne of Illinois recently appointed George Denny, of Peoria to membership on the State Mine Rescue Commission succeeding Stephen Wolschlag, deceased.

Morris H. Bush, son of the late C. G. Bush, long connected prominently with the big iron furnaces in the Birmingham district, was recently elected President of the Shelby Iron Co.

Edward Johnson, chairman of the board of directors of the Lorain Coal & Dock Co., of Columbus, Ohio, left recently for a trip to European health resorts. He was accompanied by his son.

James E. Roderick, Chief of the State Department of Mines of Pennsylvania, was recently operated on in Baltimore for an internal ailment of long standing. His condition is reported good, and an early recovery is anticipated.

Frank Bradford, Superintendent of the W. J. Rainey plant at Moyer, has been retired on a pension. He had been in the W. J. Rainey service for 33 years, being superintendent at Moyer since the death of Thomas Jones a number of years ago. He has been succeeded by Robert Hogsett, of Uniontown.

OBITUARY

W. S. Cherry, a pioneer in the development of the northern Illinois coal fields, Federal Superintendent of the Chicago, Willington & Vermillion Coal Co., died recently at his home in Streator, Ill.

TRADE CATALOGS

The Standard Underground Cable Co., Pittsburgh, Penn. "Standard Wires and Cables and Cable Accessories." Leaflet of 12 pages, 3 1/4 x 6 in.

The Buckeye Engine Co., Salem, Ohio. Bulletin No. 111-B. "Buckeye-Mobiles." Sixteen pages, 8x10 in., illustrating and describing various applications of Buckeye-Mobiles.

The Standard Underground Cable Co., Pittsburgh, Penn. "Steel-Tape-Armored Cables." Twelve pages, 6x9 in., illustrating and describing this type of cables and accessories.

The Link-Belt Co., Philadelphia, Chicago, Indianapolis. "Wagon and Truck Loaders." Thirty-two pages, 6x9 in., illustrating and describing wagon loaders and their application.

Heimiek Foundry-Machine Co., Fairmont, W. Va. "Frogs and Switches." Twenty-two pages, 5x8 in., illustrating and describing frogs, switches, crossovers and other track equipment.

The Ingersoll-Rand Co., 11 Broadway, New York. Forms Nos. 8011 and 8011-1. "Little David Riveting Hammers" and "Rivet Set Retainer for Little David Riveters." Twelve pages, 6x9 in., illustrated.

Morgan-Gardner Electric Co., Chicago, Ill. Catalog 57. "Mining Locomotives." Forty pages, 7x10 in., illustrating and describing the sizes and details of construction of Morgan-Gardner locomotives.

The Chicago Pneumatic Tool Co., Chicago and New York. Bulletin No. 154. "The Chicago Stopper." Twenty-four pages, 6x9 in., illustrating and describing the Chicago stopper with dust allayer attachment.

The Ohio Brass Co., Mansfield, Ohio. Catalog No. 14. "Overhead Materials, Rail Bonds, Car Equipment, Specialties

and High-Tension Porcelain Insulators." Bound volume of 606 pages, 6x9 in., illustrated.

The Ingersoll-Rand Co., 11 Broadway, New York. Form No. 4020 second edition. "Leyner-Ingersoll Water Drills." Thirty-two pages, 6x9 in., illustrating and describing Leyner drills and some of their applications.

The Hess-Bright Mfg. Co., Philadelphia, Penn. "Hess-Bright Ball Bearings for Axle Lighting Generators." Twelve pages, 4 1/2 x 7 in., giving a brief discussion concerning ball bearings and their application to axle generators.

The Link Belt Co., Philadelphia, Chicago, Indianapolis. Advance Section A of General Catalog No. 110. "The Original Ewart Detachable Link-Belt and Sprocket Wheels." One hundred and twelve pages, 6x9 in., illustrating and describing this type of link-belt and its attachments.

PUBLICATIONS RECEIVED

Department of the Interior, Bureau of Mines, Technical Paper 67, "Mine Signboards," by Edwin Higgins and Edward Steidle. Fifteen pages, 6x9 in., illustrated.

Department of the Interior, U. S. Geological Survey. "The Cement Industry in the United States in 1913." Twenty-six pages, 6x9 in., containing many tables and curves.

Illinois Coal-Mining Investigations Bulletin 4. "Coal-Mining Practice in District VII," by S. O. Andros. Fifty-three pages, 6x9 in., illustrated with many drawings and halftones.

Department of the Interior, Bureau of Mines. "Abstracts of Current Decisions on Mines and Mining, March to December, 1913," by J. W. Thompson. One hundred and forty pages, 6x9 in.

Department of the Interior. "Report of the Mine Inspector for the Territory of Alaska to the Secretary of the Interior for the Fiscal Year Ended June 30, 1913." Ten pages, 6x9 in., unillustrated.

Mellon Institute of Industrial Research and School of Specific Industries, Smoke Investigation Bulletin No. 7. "The Effect of Soot in Smoke on Vegetation," by J. F. Clevenger, M. A. Twenty-six pages, 6x9 in., illustrated.

University of Illinois, Engineering Experiment Station, Bulletin No. 71. "Tests of Bond Between Concrete and Steel," by Duff A. Abrams. Two hundred and forty pages, 6x9 in., with many drawings, diagrams, curves and tables.

Department of the Interior, Bureau of Mines, Bulletin 57. "Safety and Efficiency in Mine Tunneling," by David W. Brunton and John A. Davis. Two hundred and seventy-one pages, 6x9 in.; profusely illustrated with drawings and half-tones.

West Virginia Geological Survey, County Reports, 1914, Kanawha County. Bound volume of 679 pages, 6x9 in., with many tables, drawings and halftone illustrations. This volume is accompanied by three large folder maps in neat cloth-bound container of the same size as the book.

CONSTRUCTION NEWS

Scranton, Penn.—Bids will be received within a short time by the Scranton Poor District for the erection of a conveyor and coal pocket at Clark's Summit on the railroad siding used for freight for the Hillside Home.

St. Louis, Mo.—The building of the Laclede Gas Co.'s coke plant is now under good headway. This work was held up on account of the death of Jacob L. Haehlen, the coke expert of the Laclede Gas Light Co., who lost his life in the M. A. C. fire.

Streator, Ill.—Edward E. Evans, Joseph F. Baldwin, and George M. Baldwin have taken the preliminary steps toward forming a corporation for the purpose of mining coal. They have also leased land lying south of this city, and have commenced work on sinking a mine.

Cairnbrook, Penn.—The Loyalhanna Coal & Coke Co., contemplates the erection of several large blocks of houses to be built here in the next two months. After these are completed, the company will erect a large office building, a store and other structures.

Pittsburgh, Penn.—The Anthracite Coal Co., which is controlled by a number of Pittsburgh banks will soon hold a meeting to consider the erection of another breaker. This firm has developed and proven over 4,000,000 tons of Lykens Valley coal and controls 2400 acres.

Chicago, Ill.—T. A. Lemmon, receiver of the Chicago, Willing & Vermillion Coal Co., has appointed the Allen & Garcia Co., Engineers, McCormick Building, Chicago, as consulting and constructing engineers to complete the construction work at the Orient, Franklin County mine, including a new rescreening plant, concrete lining for shafts, etc.

Birmingham, Ala.—The Tennessee Coal, Iron and Railroad Co., expects to begin work next month on putting in the mining towns and operating the Bayview Mines which have been under preparation for the past two and a half years. The output at the beginning will be somewhat over 1000 tons of coal daily.

Penny, Ky.—An incline 800 ft. long will be constructed by the Elkhorn & Shelby Creek Coal Co., W. J. Christopher, manager, in the development of two mines. In addition a power plant, which may be second hand, will be purchased. A 150-hp. boiler will be procured and a small hoisting engine for the supply track as well as a drum to hold 1000 ft. of $\frac{1}{2}$ -in. wire rope.

Winchester, Ky.—A new railroad in the coal fields of eastern Kentucky is being surveyed by a force from the Wisconsin Steel Co. This will be an extension of the Cumberland Valley Branch of the Louisville & Nashville R.R. It is to run up Poor Fork from Benham, in Harlan County, through a tunnel under Pine Mountain, near Hurricane Gap, following thence the route of Line Fork to its mouth, connecting there with the Lexington & Eastern Ry., also an L. & N. line. The length of the road will be 10 to 14 miles. It will give Winchester a short route to the Harlan coal fields.

NEW INCORPORATIONS

Mascoutah, Ill.—The Kolb Coal Co. has increased its capital from \$11,000 to \$200,000.

Chicago, Ill.—The Marquette Third Vein Coal Mining Co. has changed its name to the LaSalle-Hennepin Coal Co.

Hillsboro, Ill.—The Ocnee Coal Co. has been organized to do a general coal mining business. The capital stock is \$10,000, and the incorporators are Frank L. McDavid, Amos Miller and John R. McDavid.

McAllester, Okla.—The Kennedy Coal Co., of McAllester has been organized with a capital stock of \$10,000. The incorporators are G. O. Nolley of Wister, L. P. Sorrells, and W. E. Harley, of McAllester.

Davenport, Iowa—The Wisconsin Mine & Development Co., of Davenport, Iowa, has been organized with a capital stock of \$20,000 for the purpose of mining coal. The incorporators are Carl L. Lambach, Leon J. Zoekier, Charles S. Simpson, Jacob Vogler and Z. E. Haywood, all of Davenport, Iowa.

INDUSTRIAL NEWS

New York, N. Y.—The Seaboard Air Line Ry. recently placed an order for between 500,000 and 600,000 tons of coal. This order was divided between the Pratt Consolidated Coal & Iron Co., the Alabama Fuel & Iron Co., and the Alabama Co.

Spokane, Wash.—Effective July 1, the rate on coal from the Bear Creek, Mont. district to Spokane, will be reduced by all railroads from \$3.60 to \$3.50. This will make the rate on Bear Creek coal equivalent to that on coal from the Red Lodge district.

Republic, Penn.—Fifty miners recently organized the Republic section of the American Mine Safety Association. The following officers were elected: W. W. Fleming, president; Ralph Keenan, vice-president; and C. H. Millward, secretary and treasurer.

Pottsville, Penn.—Surface rights of a 32-acre farm lying between Minersville and Pottsville, and known as the James Farm have been purchased by a syndicate for \$14,000. A part of the tract will be laid out as a town, but much of it will be developed for coal mining.

Johnstown, Penn.—A \$60,000 coal deal was consummated recently when T. S. Davis of Eversburg purchased through Howard Davis, the Conemaugh real estate dealer, several tracts of valuable coal land lying between Conemaugh and Mineral Point, comprising about 800 acres in all.

Des Moines, Iowa—Seven of the 9 railroads which began action in the United States District Court in December, 1910, to prevent the enforcement of lower rates on coal ordered by the State Railroad Commission have abandoned their cases, while the two remaining roads, the Rock Island and Minneapolis & St. Louis, are expected to dismiss their suits within the next few days.

Pittsburgh, Penn.—The first shipment of Monongahela River coal forwarded direct from Pittsburgh and consigned to the Panama Canal Zone will follow an expected rise in the Ohio River. The towboat "Exporter" has a tow of 22 barges of coal to be delivered at New Orleans, there to be transferred to colliers and by them unloaded at the receiving station at the Panama Canal.

Victoria, B. C.—A considerable quantity of sawdust briquetts is being manufactured at Victoria, while a firm at Vancouver is building a briquette factory. The refuse from the saw mills is cut into small pieces, thoroughly dried, and finally compressed. The briquetts are 3 in. in diameter, and the total cost of production is said to be only \$3 per ton. The selling price will be governed by that of coal. It is claimed that these briquetts are a better fuel than either coal or wood.

Connellsville, Penn.—The Baltimore & Ohio R.R. has found coke breeze a satisfactory fuel for use in locomotives equipped with automatic stokers. This is indicated by the fact that the railroad is loading two or three carloads of this waste material every day at Leisenring and is taking quantities away from Juniata and other points, while it is unofficially stated that negotiations are being made with the H. C. Frick Coke Co. for the entire coke breeze output of its plants.

Birmingham, Ala.—The Tennessee Coal, Iron & Railroad Co. announces the addition of another plant to its operations. This firm will erect a plant for the manufacture of basic slag fertilizer at a cost of between \$300,000 and \$500,000. The utilization of basic slag for fertilizer has never before been attempted in this section. The fertilizer to be made is said to be superior to the basic bessemer slag fertilizer which is used in the German Empire, and about 20,000 tons of which are imported to this country each year.

Toronto, Ont.—The Pacific Coast Collieries, Ltd., is offering an issue of \$500,000, of 30-year 6 per cent. bonds, at 98 and interest. Its authorized bond issue is \$3,500,000, of which \$1,600,000 are issued. The company was incorporated to acquire the Pacific Coast Coal Mines, Ltd., with valuable coal holdings at South Wellington, Suquash and other points on the east coast of Vancouver Island. The South Wellington and Suquash properties are estimated to contain 200,000,000 tons of bituminous coal, approximately half of which has been proved.

Pensacola, Fla.—Loading 5000 tons of coal in one day, the navy collier "Brutus" recently sailed for Galveston with the initial shipment of Alabama coal for the Navy.

Pittsburgh, Penn.—According to operators more coal has been moved to the Great Lakes during the past week or ten days than during any other period of this year. The resumption has been made possible by a better iron ore movement which brought vessels for coal cargoes to the lower lakes. The shipment has increased mining operations and a larger force of men have been put to work, with the prospect, the operators say, of a complete resumption of lake coal shipment by July 1.

Milwaukee, Wis.—Judge Page of the District Court recently found that there was an unlawful combination in restraint of the sale of anthracite coal in Milwaukee County, but that the guilty persons were not in the jurisdiction of said county. The Court held that no coal was sold in Milwaukee, either wholesale or retail, in the open market by dealers in competition. The evidence produced during the investigation has been submitted to Attorney-General MacReynolds to be used in possible prosecution of dealers in Pennsylvania and Ohio, from which states most of the coal used in Milwaukee is received.

Toronto, Ont.—The Nova Scotia Commissioner of Works and Mines has introduced a bill in the legislature for aiding the Intercolonial Coal Co. to acquire the property formerly owned by the Acadia Coal Co., and to install plant for working the same. The bill proposes to guarantee the payment of a loan not exceeding \$100,000 and interest at 5 per cent. The output of the Intercolonial has been steadily decreasing, owing to the increased cost of working at a greater depth. The same difficulty caused the stoppage of work at the Acadia property adjoining. The reorganization now undertaken provides for the more economical working of the Acadia vein by the Intercolonial with the aid to be afforded by the government.

Coal Trade Reviews

General Review

Further curtailment in the anthracite regions and demand easing off all along the line. Bituminous consumers crowding operators for better prices and market weak with more declines in sight. Lake trade fair in some sections. Uncertainties in the Ohio situation rapidly clearing up.

Many of the hard coalers are still working full time, but curtailed operations are becoming more general throughout the mining regions, and the end of the current month will see practically all companies on a short schedule. The demand is gradually easing off all along the line, and there are complaints from different quarters as to the poor business, but as a rule the trade generally is pulling along at about the customary midsummer rate. The opening period saw a slow movement, particularly in the Lake trade, and it is possible that the summer business may be accelerated in order to wipe out the deficiency made there.

The general heaviness in bituminous has been further accentuated during the past week. The market seems to be absolutely devoid of any absorbing power, and consumers are more thoroughly in control of the situation than at any time during the current year; they are eagerly taking advantage of the weakened condition of the market to crowd the agencies for better prices, and in most cases find the latter ready to make concessions in order to hold favored business. An increased demand from the West and Northwest, as a result of the labor unsettlement in Ohio, supplemented by an abnormal export business, have been the only favorable developments in the Atlantic Seaboard trade.

Under the stimulus of the increasing Lake trade, and a complete shutdown throughout all the Ohio fields, the Pittsburgh district is enjoying a steadily increasing business. Contracts as a rule continue at the full circular, although prices in the spot market are irregular, and the line trade light. However, persistent work by the selling agencies has resulted in keeping the coal moving while operators are becoming less insistent upon working the mines full time, and the trade seems to be on a more equitable basis.

Insofar as market conditions go, there has been little change in the situation in Ohio, the most important development of the week being the decision of the Supreme Court upholding the constitutionality of the new screen law. What the ultimate effect will be remains to be seen, but at any rate the uncertainty has been removed, and the participation of Governor Cox in the labor conferences, toward the close of the week, gives promise of a speedy solution of the wage-scale question also.

The bunkering trade at Hampton Roads was abnormally heavy during the week, although the dumpings as a whole were only fair, and Coastwise business rather light. The Southern markets slowed down somewhat, orders for both steam and lump coal being few, and the majority of the mines reducing operations to four days a week, although a few still maintain full time. A heavy demand from the country trade in the Middle West, due to the large crops, has injected a rather better tone in the situation, and the market is relatively strong. Prices are somewhat firmer, while an unexpected car shortage on one of the main coal roads has created some apprehension over the outlook this fall.

EASTERN MARKET

BOSTON

Market largely in buyers' hands; Pocahontas and New River still being forced on inland territory. Water freights very low and steamers being tied up. Pennsylvania grades unchanged, with some operators trying to meet low prices on other coals. Anthracite business continues fair, with no difficulty about filling June requisitions.

Bituminous—There is no relief to the generally weak market that prevails in this territory, particularly on Pocahontas and New River coals. Prices are practically in the hands of the buyer, whether in small lots or by the cargo. Practically every discharging point today has quantities of coal in bottoms waiting for orders and so long as cargoes come forward

unsold in this way so long will the market show its weakness. More than one steam collier has been laid up within a fortnight because orders are so scarce and it would be no difficult matter to charter transportation from Hampton Roads to Boston for one trip, say, at 50c., perhaps the lowest water freight that has been named in several years.

There is no longer any more than a thinly veiled pretence of asking \$2.85, f.o.b. Norfolk or Newport News. Delivered prices are frankly based on nearer \$2.65 on the few sales that are being made and on any but the fanciest grades. Even on this basis the tonnage is small and in an ordinary year it would be considered negligible. The less favorably known coals are being offered down to as low as \$2.50. In brief, the New England tidewater market is about as near being demoralized as at any time since 1909. A three- to five-week wait on large vessels for the cargo to be disposed of is now nothing unusual, and if the situation holds at so low an ebb there will be some demurrage bills to pay.

Under such conditions it is rather a poor prospect here for coals mined in Pennsylvania. In a few instances, however, operators there have met the situation and are getting some scattered business at prices that net down to \$1.10@1.20 for grades that are well regarded. The number of mines in position to keep running in times like these is relatively small and the volume of coal placed is hardly significant. The position of Georges Creek coals in this market bears close analogy to that of the better Pennsylvania grades. They, however, in considerable degree have their own transportation and are enabled to make delivered prices that defy analysis. F.o.b. prices on Georges Creek are firmly held on the season basis.

Anthracite—There are no new developments in hard coal. New business is still subject to short delay in shipment, but the companies are freely soliciting orders for June delivery. There is only a scattering business, however, and not enough to keep the mines on full time for much longer. One small feature of the anthracite market just now is the extreme slowness with which fancy grades of Lehigh are being shipped. There are many April orders that are still unfilled.

Current quotations on bituminous at wholesale are about as follows:

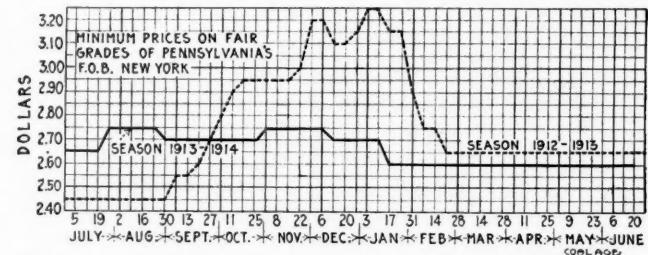
	Clearfields	Cambridges	Georges Creek	Pocahontas New River
Mines*	\$0.90@1.45	\$1.10@1.60	\$1.67@1.77	
Philadelphia*	2.15@2.70	2.35@2.85	2.92@3.02	
New York*	2.45@3.00	2.65@3.15	3.22@3.32	
Baltimore*			2.85@2.95	
Hampton Roads*				\$2.60@2.85
Boston†				3.40@3.68
Providence†				3.30@3.68

* F.o.b. †On cars.

NEW YORK

Bituminous production still further restricted. Requisitions on contracts at about 60%. Anthracite heavy, but about normal for this period. Stove the only active size. Much coal going into storage.

Bituminous—There is a total absence of any new features in the New York soft-coal market and, if anything, the general heaviness has been further accentuated during the past week. While present indications are that June will show a heavier movement than May, due principally to the delay in



getting under operations in the latter month, production for the current week will be less than last week. Requisitions on contracts range from nothing in some lines, such as steel, for instance, up to full quotas in others, such as municipal and public-service corporations, the general average on all contracts probably being around 60%.

The indications that operators are refraining from sending consignment coal to Tidewater, still prevail, no embargoes being reported and coal on demurrage seldom heard of; but, on the other hand, there is considerable coal being carried on boats to avoid demurrage. West Virginia mines shipping this market are on about 40% capacity, while the western Maryland operators are down to about three days per week. An unusual demand from the Western roads, due to the shutdown in Ohio, has created some activity in West Virginia gas fuel.

Most agencies continue optimistic over the future and see indications of an active market this fall, but the current trade is about as dull and flat as could be expected. The nominal market, at which probably no prompt business is being negotiated, continues unchanged as follows: West Virginia steam, \$2.50@2.60; fair grades Pennsylvania, \$2.60@2.70; good grades of Pennsylvania, \$2.70@2.80; best Miller Pennsylvania, \$3.10@3.15; Georges Creek, \$3.15@3.25.

Anthracite—While some companies continue on a full-time basis, restriction of operations in the hard-coal regions is becoming steadily more general. The end of the current month will probably see all the large companies working on a curtailed basis. However, as a rule, the trade is pulling along about as is to be expected at this period of the year, although there are many complaints of poor business in some quarters. Undoubtedly, the market is easy on all grades. Large tonnages of the steam sizes are reported afloat where they have been placed as a last resource to avoid demurrage.

Stove coal continues the leader and is the only grade in which there can be said to be any demand at all. Egg and nut are slowing up, considerable of both grades going into storage; the Erie R.R. is reported short of egg coal, however. In the steam department, pea, buckwheat and barley are all in excess supply and difficult to move even at substantial concessions on the circular. No. 2 buckwheat is the only steam grade at all active and it is only in fair demand. We quote the New York market on the following basis:

	Upper Ports		Lower Ports	
	Circular	Individual	Circular	Individual
Broken.....	\$4.80	\$4.55@4.70	\$4.75	\$4.50@4.65
Egg.....	5.05	4.80@4.95	5.00	4.75@4.90
Stove.....	5.05	4.95	5.00	4.90
Chestnut.....	5.30	5.00@5.20	5.25	4.70@5.15
Pea.....	3.55@3.60	3.30@3.60	3.45@3.50	3.10@3.45
Buckwheat.....	2.80	2.60@2.80	2.50@2.75	2.00@2.75
Rice.....	2.30	2.25@2.30	2.00@2.25	1.60@2.25
Barley.....	1.80	1.60@1.80	1.70@1.75	1.25@1.70

PHILADELPHIA

Anthracite business continues to shrink, and demand is practically centered on certain sizes. Curtailed operations likely this month. No improvement in bituminous.

Anthracite—It is more apparent daily that the usual falling off in the demand for anthracite is developing earlier than usual. There is practically no call for chestnut, and it is safe to say that 50% of the small sizes now being produced would more than meet the requirements on contracts. With this surplus, and with storage facilities already crowded, the producing interests are rather chary about continuing operations, and full-time work will be the exception rather than the rule from now until fall.

Prices on chestnut and pea have been cut heavily by the individual operators, and if the demand for stove was not sufficient to take care of the entire output, the large companies would not have the only incentive the customer has in placing orders with them for other sizes. It has proved a potent lever in more than one instance, in securing orders. While it is understood that the New England business still continues fair, there is every indication that the dealers are becoming filled up, and the end of June may find this branch of the trade in the same condition. Prices at tidewater are quoted about on a parity with the week previous.

Bituminous—Taking the situation as a whole, there is little improvement, although there seems to be a feeling in the trade that conditions will grow more favorable as the coal year advances. Spot coal appears to be in better demand, although customers are loth to pay any advance over existing prices.

BALTIMORE

Improvement in anthracite trade and an increasing export business in bituminous. Soft coal spot market weak, and contract demand light.

An element of briskness to the anthracite trade developed the past week. The delayed purchasing of storage fuel for the coming fall and winter season has at last awakened. There was considerable movement along that line. Industrial fuels remain in poor demand as a whole. All classes of hard coal are in easy supply, and yards as a rule are well stocked for the season.

The most promising features in bituminous are the inquiries from the Northwest and West, and the heavy export

business. Prices are steady, West Virginia three-quarter gas holding around 80c., run-of-mine at from 70 to 75c. and slack 50c. Pennsylvania low-grade coals command from 95c. to \$1.10, with best fuel holding firmly around \$1.35 to \$1.40.

Export business is taking a wider range all the time. Heavy shipments sent to French, Italian, Spanish and Egyptian ports are cutting heavily into a field that was at one time almost monopolized by coals from Great Britain.

CENTRAL STATES

PITTSBURGH

No change in activity from formal acceptance of wage scale. Mining operations at over 75%, almost wholly on Lake business. Prompt prices still irregular. Coke stagnant; shipments exceeding production and tending to liquidate accumulations.

Bituminous—There was no return of the miners to work last week, as reported in the daily press. The formal acceptance of the wage scale for the new period occurred, but the men had already gone back to work to the extent that employment was available for them.

Mining operations have shown a slight further increase. Some large interests are operating almost full, or at 80 to 90% of capacity, and the average for the whole district is probably above 75%. The line trade is still extremely light, and the domestic trade amounts to very little, but Lake shipments are very good, considering the dullness in other quarters. The Pittsburgh district is naturally profiting by the partial idleness in other sections.

Prices for free coal continue to be quite irregular, and some important contracts are being booked at concessions, but as a rule contracts are reported as being made at full list prices. Slack on some divisions continues to sell down to 55c., but only in prompt lots. The majority of operators refuse to make contracts for slack for less than twelve months, then quoting 90c. or in a few cases 80c. Regular list prices are: Slack, 90c.; nut and slack, \$1.05; nut, \$1.25; mine-run, \$1.30; ¾-in., \$1.40; 1¼-in., \$1.50, per ton at mine, Pittsburgh district.

Connellsville Coke—The market continues to drag. There is no demand for prompt furnace coke and as it is offered at less than contract prices quoted, furnaces are disposed to buy from hand to mouth rather than contract for third-quarter or second-half. There is somewhat more interest in foundry coke, as most contracts expire at the end of this month, but negotiations for the new twelve-month are not yet very active. The market is quotable as follows: Prompt furnace, \$1.75@1.85; contract furnace, \$1.85@2; prompt foundry, \$2.35@2.65; contract foundry, \$2.35@2.65, per ton at ovens.

The "Courier" reports production in the Connellsville and lower Connellsville region in the week ending June 6 at 243,609 tons, a decrease of 419 tons, and shipments at 254,831 tons, an increase of 1394 tons. Shipments appear to have exceeded production by 11,222 tons, helping to make up for the many weeks in which the balance was in the opposite direction.

BUFFALO

Bituminous steady. No improvement in sight, though the volume of business is slowly increasing. Activity hardly possible before fall. Anthracite moving about normally with a light local trade.

Bituminous—There is a small increase in the movement of bituminous due largely to hard work on the part of the selling agencies. The trade is slowly settling down to a more steady business. Nobody expects to sell more than a moderate amount but all are making an effort to sell the coal before it leaves the mines, as it is a hard matter to make a profit on anything that is sold under pressure.

The operators are not so insistent about working and if a representative cannot keep the mines running they are prepared to slow down. There are few operations tributary to this market that are running more than half time, but only a few are shut down, for it is possible to make some profit. There is no complaint at present of cheap coal offering at consumers' prices and the situation is clearing up materially in that direction. There is some coal selling on contract at prices close to those of a year ago. The railroads are only buying moderately; they refuse to stock up and are not likely to make any sort of outlay that they can avoid.

There is less report of price cutting, though it is not denied that only the best coal can command full quotations. Pittsburgh lump brings, per circular, \$2.80; three-quarter, \$2.70; mine-run, \$2.55 and slack, \$2.15, with Allegheny Valley sizes about 25c. lower.

Coke—There is still a falling off in the coke production, due to the slow operations at the iron furnaces. Districts in any way dependent on the large coke-making centers for business report an added quiet condition of late. Prices are lower, \$4.25 for best 72-hr. Connellsville foundry now being quoted.

Anthracite—The Lake movement is fair, the rail line-trade quiet and the city demand light. These conditions commonly prevail at this time of the year, but they were not preceded by the usual shipments early in the season, so that the shippers would be pleased to be able to make up some of the deficiency. If it is not done through the summer it will have to be done next fall, when the demand is excessive.

Reports from the Upper-Lake docks are not reassuring, as consumers are not buying heavily enough to relieve the docks very much. It is believed that the coming heavy crops alone will insure liberal buying in the fall, but it is likely all to come in a lump and embarrass the shippers as is usually the case. Shipments by Lake for the week amount to 169,000 tons, according to the custom-house report.

TOLEDO

Market continues heavy but the outlook much improved. Threshing demand already coming in and record-breaking crops will stimulate business generally. Unfavorable outlook in transportation lines.

The coal movement continues sluggish although there is some indication of improvement and it is generally conceded that threshing coal will be in heavy demand within a short time. Ohio is slated for unusually large crops this season. Crops all over the country are looking good and coal men are predicting a big car shortage the coming fall. The railroads have been buying little or no equipment to replace that condemned a couple of years ago. The mine difficulties should be adjusted shortly, while factories, which have been ~~using~~ ^{now} in the mines, are getting back to work. Operators are becoming less insistent upon working the mines full time, and the trade seems to be on a more equitable basis.

Insofar as market conditions go, there has been little change in the situation in Ohio, the most important development of the week being the decision of the Supreme Court upholding the constitutionality of the new screen law. What the ultimate effect will be remains to be seen, but at any rate the uncertainty has been removed, and the participation of Governor Cox in the labor conferences, toward the close of the week, gives promise of a speedy solution of the wage-scale question also.

The bunkering trade at Hampton Roads was abnormally heavy during the week, although the dumpings as a whole were only fair, and Coastwise business rather light. The Southern markets slowed down somewhat, orders for both steam and lump coal being few, and the majority of the mines reducing operations to four days a week, although a few still maintain full time. A heavy demand from the country trade in the Middle West, due to the large crops, has injected a rather better tone in the situation, and the market is relatively strong. Prices are somewhat firmer, while an unexpected car shortage on one of the main coal roads has created some apprehension over the outlook this fall.

EASTERN MARKET

BOSTON

Market largely in buyers' hands; Pocahontas and New River still being forced on inland territory. Water freights very low and steamers being tied up. Pennsylvania grades unchanged, with some operators trying to meet low prices on other coals. Anthracite business continues fair, with no difficulty about filling June requisitions.

Bituminous—There is no relief to the generally weak market that prevails in this territory, particularly on Pocahontas and New River coals. Prices are practically in the hands of the buyer, whether in small lots or by the cargo. Practically every discharging point today has quantities of coal in bottoms waiting for orders and so long as cargoes come forward

there is just cause for apprehension on the part of the retail trade. But dealers are not worrying, and are making no effort to lay in coal. It is estimated that the number of idle miners in Ohio and West Virginia is close to 60,000, and this necessarily means a serious fuel shortage somewhere. Of course, the present dullness in manufacturing lines wipes out a part of the shortage, but, aside from this, there is little coal in stock. The demand is bound to come later on, and from present indications there will not be enough coal to supply it.

COLUMBUS

Conference of the scale committee before Governor Cox. Decision from the U. S. Supreme Court on the constitutionality of the anti-screen law. Trade still playing a waiting game.

The latest development in the mining situation in the Buckeye State is the calling of another conference of the scale committee made at the request of Governor Cox who is anxious to see the wage scale adjusted. The decision from the United States Supreme Court upholding the constitutionality of the Green anti-screen law has cleared away this uncertainty.

Some increase in the demand for steam grades is reported from certain sections of the state. It appears that the surplus stocks are exhausted and steam users have been compelled to purchase West Virginia coal. Prices for that class of fuel are extremely low, mine run being quoted down to 80c. Some demand for domestic sizes has also developed but dealers' stocks have been sufficient to take care of this trade. Some of the larger users of domestic grades are laying in their fuel supply. Orders have been placed with dealers for delivery during the latter part of June or early in July. Pocahontas and West Virginia splints are the favorite grades in the domestic demand.

Trade is not yet out for much longer. One small feature of the anthracite market just now is the extreme slowness with which fancy grades of Lehigh are being shipped. There are many April orders that are still unfilled.

Current quotations on bituminous at wholesale are about as follows:

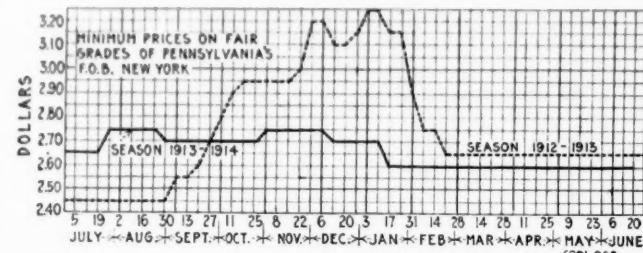
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Philadelphia*	2.15@2.70	2.35@2.85	2.92@3.02	
New York*	2.45@3.00	2.65@3.15	3.22@3.32	
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NEW YORK

Bituminous production still further restricted. Requisitions on contracts at about 60%. Anthracite heavy, but about normal for this period. Stove the only active size. Much coal going into storage.

Bituminous—There is a total absence of any new features in the New York soft-coal market and, if anything, the general heaviness has been further accentuated during the past week. While present indications are that June will show a heavier movement than May, due principally to the delay in



getting under operations in the latter month, production for the current week will be less than last week. Requisitions on contracts range from nothing in some lines, such as steel, for instance, up to full quotas in others, such as municipal and public-service corporations, the general average on all contracts probably being around 60%.

In addition to cargoes of New River and Pocahontas mine-run there has been some movement of nut and slack and high volatile coals to the New England ports and to the South as well. The government has also taken two cargoes of Pocahontas coal for the stations at San Diego and Mare Island, Calif.

Perhaps the largest quantity of bunker coal loaded into any one vessel at this port for some time went into the S. S. "Banffshire" which took 3750 tons. This vessel was en route from New York to Sydney, N. S. W.

LOUISVILLE

Prices stiffer in the eastern Kentucky field, with indications of still better conditions in the fall.

A continued stiffening of the domestic market is the principal feature in the eastern Kentucky field, while little change is reported from the western end of the state, the demand for domestic sizes from that section usually being a later development. Eastern Kentucky operators have booked orders well on through July and August, at an average advance of 10c. on the ton for each month. On September business operators are finding it possible to hold out for higher prices. Little change for the better has been marked in the industrial demand, though it is considered that the situation with respect to the Kentucky market will improve shortly.

SOUTHERN AND MIDDLE-WESTERN

Rice.....	2.30	2.25@2.30	2.00@2.25	1.60@2.25
Barley.....	1.80	1.60@1.80	1.70@1.75	1.25@1.70

PHILADELPHIA

Anthracite business continues to shrink, and demand is practically centered on certain sizes. Curtailed operations likely this month. No improvement in bituminous.

Anthracite—It is more apparent daily that the usual falling off in the demand for anthracite is developing earlier than usual. There is practically no call for chestnut, and it is safe to say that 50% of the small sizes now being produced would more than meet the requirements on contracts. With this surplus, and with storage facilities already crowded, the producing interests are rather chary about continuing operations, and full-time work will be the exception rather than the rule from now until fall.

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Bituminous—Taking the situation as a whole, there is little improvement, although there seems to be a feeling in the trade that conditions will grow more favorable as the coal year advances. Spot coal appears to be in better demand, although customers are loth to pay any advance over existing prices.

BALTIMORE

Improvement in anthracite trade and an increasing export business in bituminous. Soft coal spot market weak, and contract demand light.

An element of briskness to the anthracite trade developed the past week. The delayed purchasing of storage fuel for the coming fall and winter season has at last awakened. There was considerable movement along that line. Industrial fuels remain in poor demand as a whole. All classes of hard coal are in easy supply, and yards as a rule are well stocked for the season.

The most promising features in bituminous are the inquiries from the Northwest and West, and the heavy export

obtain the increase in freight rates which will mean that the curtailment in expenditures will be ended and naturally the coal market will be affected favorably. Most of the railroads close their fiscal year June 30 and so are spending as little as they possibly can for the time being. It is expected that after July 1 they will begin buying coal for storage as a heavy rush is looked forward to in the fall. Another factor in the expected improvement is that large orders are anticipated by the steel trade on account of the advanced freight rates.

Although anthracite sales have been below normal since Apr. 1, the year's business will be up to the usual figure, with rush deliveries during August, September and October. Reasonably strong conditions prevail in the smokeless coal market. While there is considerable of this grade offered at \$1 a ton, the larger companies are holding to the circular price of \$1.25 for mine run, on contract coal. There is little demand for lump and egg, but the supply is no better.

There is a variety of prices demanded for Franklin County coal. One company is getting some business at \$1.50 for lump, egg and No. 1 nut while another, now getting \$1.35, announces that the price will be advanced to \$1.50, July 1. Several companies are quoting \$1.25 and others have even gone below that figure. Mines in this district are running an average of three days a week. Prospects are fair in the Carterville district, with price conditions similar to those in Franklin County. With the demand for screenings increasing there is a scarcity evident which was not anticipated. During the week the price has increased about ten cents a ton for the better grade and five cents for the ordinary. Dull conditions still prevail in the spot market for hard coke, but an improvement is looked for during the second half of the year.

Prevailing prices at Chicago are:

Connellsville Coke—The market continues to drag. There is no demand for prompt furnace coke and as it is offered at less than contract prices quoted, furnaces are disposed to buy from hand to mouth rather than contract for third-quarter or second-half. There is somewhat more interest in foundry coke, as most contracts expire at the end of this month, but negotiations for the new twelve-month are not yet very active. The market is quotable as follows: Prompt furnace, \$1.75@1.85; contract furnace, \$1.85@2; prompt foundry, \$2.35@2.65; contract foundry, \$2.25@2.65, per ton at ovens.

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BUFFALO

Bituminous steady. No improvement in sight, though the volume of business is slowly increasing. Activity hardly possible before fall. Anthracite moving about normally with a light local trade.

Bituminous—There is a small increase in the movement of bituminous due largely to hard work on the part of the selling agencies. The trade is slowly settling down to a more steady business. Nobody expects to sell more than a moderate amount but all are making an effort to sell the coal before it leaves the mines, as it is a hard matter to make a profit on anything that is sold under pressure.

The operators are not so insistent about working and if a representative cannot keep the mines running they are prepared to slow down. There are few operations tributary to this market that are running more than half time, but only a few are shut down, for it is possible to make some profit. There is no complaint at present of cheap coal offering at consumers' prices and the situation is clearing up materially in that direction. There is some coal selling on contract at prices close to those of a year ago. The railroads are only buying moderately; they refuse to stock up and are not likely to make any sort of outlay that they can avoid.

There is less report of price cutting, though it is not denied that only the best coal can command full quotations. Pittsburgh lump brings, per circular, \$2.80; three-quarter, \$2.70; mine-run, \$2.55 and slack, \$2.15, with Allegheny Valley sizes about 25c. lower.

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Anthracite—The Lake movement is fair, the rail line-trade quiet and the city demand light. These conditions commonly prevail at this time of the year, but they were not preceded by the usual shipments early in the season, so that the shippers would be pleased to be able to make up some of the deficiency. If it is not done through the summer it will have to be done next fall, when the demand is excessive.

Reports from the Upper-Lake docks are not reassuring, as consumers are not buying heavily enough to relieve the docks very much. It is believed that the coming heavy crops alone will insure liberal buying in the fall, but it is likely all to come in a lump and embarrass the shippers as is usually the case. Shipments by Lake for the week amount to 169,000 tons, according to the custom-house report.

TOLEDO

Market continues heavy but the outlook much improved. Threshing demand already coming in and record-breaking crops will stimulate business generally. Unfavorable outlook in transportation lines.

The coal movement continues sluggish although there is some indication of improvement and it is generally conceded that threshing coal will be in heavy demand within a short time. Ohio is slated for unusually large crops this season. Crops all over the country are looking good and coal men are predicting a big car shortage the coming fall. The railroads have been buying little or no equipment to replace that condemned a couple of years ago. The mine difficulties should be adjusted shortly, while factories, which have been using up their surpluses, will again be in the market for coal and the Lake movement will be heavier.

Pocahontas coal is exceedingly scarce and high in price. The situation here has not been affected in the slightest degree by the closing down of Ohio mines; in fact it is believed to have been a good thing for the market. The list prices thus far remain unchanged although it is expected that some changes will be made the first of the month.

CLEVELAND

Trade dull in all lines and the general situation in coal unchanged. Many concerns still reported to have large stocks. Prices about the same as last week.

A resumption of operations in Ohio may be brought about after the meeting this week between the Ohio operators and the scale committee of the miners, at which Governor Cox will probably be present. Many of the Ohio mine owners are of opinion that an adjustment will be agreed upon along the lines of the western Pennsylvania mine-run basis.

Pittsburgh slack is offered for shipment at from 45c. to 55c. at the mines, freight rate \$1, Cleveland, with the absorbing power about one fifth of normal. Fairmount mine-run is quoted at \$1.90 to \$1.95 f.o.b. Cleveland and $\frac{3}{4}$ inch lump at \$2 to \$2.05.

The general feeling is that when fall orders begin to come, the railroads will be unable to handle shipments because their equipment is in such poor condition.

Lake Shipments have decreased slightly since last week. With poor demand throughout the Northwest and with some of the docks at Duluth and Superior still out of commission because of the recent gale, the other docks have become jammed, making coal cargoes not quite so plentiful.

Shipment prices are as follows:

	Pocahontas	Youghiogheny	Fairmount
Lump.....	\$3.15	\$2.35	
Lump, $\frac{1}{4}$ -in.....		2.25	
Lump, $\frac{3}{4}$ -in.....	2.60	2.10	\$2.00@2.05
Mine run.....	3.15		1.90@1.95
Egg.....		2.15	
Nut.....			
Slack.....	2.20@2.35	1.60	1.65

CINCINNATI

Heavy curtailment as a result of the labor trouble has not yet affected the market. Abnormally slow steam demand hampering the entire trade. Both rail and Lake business is very poor.

The business depression in practically all lines continues to exercise an unfavorable influence, practically offsetting even the good domestic demand for smokeless. The difficulty in moving slack has so curtailed the production of domestic smokeless and splint that there is not sufficient to meet the call of the trade. The bituminous market is weak, however, and it can hardly be said that there is any encouraging factor at present.

The prospects for continued idleness in the Kanawha field do not seem to have affected the market as yet, although

there is just cause for apprehension on the part of the retail trade. But dealers are not worrying, and are making no effort to lay in coal. It is estimated that the number of idle miners in Ohio and West Virginia is close to 60,000, and this necessarily means a serious fuel shortage somewhere. Of course, the present dullness in manufacturing lines wipes out a part of the shortage, but, aside from this, there is little coal in stock. The demand is bound to come later on, and from present indications there will not be enough coal to supply it.

COLUMBUS

Conference of the scale committee before Governor Cox. Decision from the U. S. Supreme Court on the constitutionality of the anti-screen law. Trade still playing a waiting game.

The latest development in the mining situation in the Buckeye State is the calling of another conference of the scale committee made at the request of Governor Cox who is anxious to see the wage scale adjusted. The decision from the United States Supreme Court upholding the constitutionality of the Green anti-screen law has cleared away this uncertainty.

Some increase in the demand for steam grades is reported from certain sections of the state. It appears that the surplus stocks are exhausted and steam users have been compelled to purchase West Virginia coal. Prices for that class of fuel are extremely low, mine-run being quoted down to 80c. Some demand for domestic sizes has also developed but dealers' stocks have been sufficient to take care of this trade. Some of the larger users of domestic grades are laying in their fuel supply. Orders have been placed with dealers for delivery during the latter part of June or early in July. Pocahontas and West Virginia splints are the favorite grades in the domestic demand.

While Ohio mines are still idle there is a considerable tonnage from West Virginia and Kentucky being shipped to the Lakes for the Northwest. The Toledo docks of the Hocking Valley Railway have handled more than a half million tons since the opening of navigation. The ore trade is quiet and this has a bad effect on an active Lake trade for coal.

What quotations are being made in the Ohio fields are as follows:

	Hocking	Pittsburgh	Pomeroy	Kanawha
Domestic lump....	\$1.50@\$1.40	\$1.20@\$1.15	\$1.50@\$1.40	\$1.50@\$1.40
2-inch.....	1.35@ 1.30	1.35@ 1.30	1.35@ 1.30	1.30@ 1.25
Nut.....	1.30@ 1.25		1.25@ 1.20	1.25@ 1.20
Mine-run.....	1.15@ 1.10	1.10@ 1.05	1.15@ 1.10	1.10@ 1.05
Nut, pea and slack.	0.85@ 0.80		0.85@ 0.80	0.80@ 0.75
Coarse slack.....	0.75@ 0.70	0.85@ 0.80	0.75@ 0.70	0.70@ 0.65

DETROIT

No actual improvement noted but a generally better feeling prevails. Anthracite gradually slowing down.

Bituminous—While there has been little improvement in the coal business itself, there is a decidedly more hopeful feeling in general industrial circles which should be reflected in the coal industry shortly. In fact, the market seems to be gradually gaining strength and prices are already stiffening, though without any specific advance as yet. The high price of \$2.25 on Pocahontas egg and lump is still being nominally held, though sales down to as low as \$2 are reported. Slack is weak and considerably in over-supply, selling down to 55c. per ton and in some cases as low as 40c. An increase of 15c. is predicted by the first of next month. West Virginia operators are now demanding \$1.50 for lump coal. There is little or no Ohio fuel coming into this market, and there will be none until the labor situation is straightened out there.

Anthracite—The hard-coal market is gradually slowing down, business so far this month being confined to receiving last month's shipments. However, it is expected that the end of the month will find the customary activity which prevails when the summer discount is in effect.

Coke—The coke market continues dull and unsatisfactory, several cars of Connellsburg having been disposed of at a substantial concession in the circular, although circular prices are generally being maintained as follows: Connellsburg, \$2.90 and Solvay, \$3.25, f.o.b. ovens.

HAMPTON ROADS

Shipments during week only fair. Large fleet of bunker steamers taken care of. Quantity of loaded cars on railroad yards still in excess of normal.

Although there has been a large number of vessels in port during the week the dumpings over the various piers will in all probability show up only fair. Cargoes destined both foreign and coastwise have not been extra heavy but the supply of bunker steamers has been large. Such cargoes as have moved foreign went to Kingston, Trieste, Santiago, Montevideo, Manaos and Para.

In addition to cargoes of New River and Pocahontas mine-run there has been some movement of nut and slack and high volatile coals to the New England ports and to the South as well. The government has also taken two cargoes of Pocahontas coal for the stations at San Diego and Mare Island, Calif.

Perhaps the largest quantity of bunker coal loaded into any one vessel at this port for some time went into the S. S. "Banffshire" which took 3750 tons. This vessel was en route from New York to Sydney, N. S. W.

LOUISVILLE

Prices stiffer in the eastern Kentucky field, with indications of still better conditions in the fall.

A continued stiffening of the domestic market is the principal feature in the eastern Kentucky field, while little change is reported from the western end of the state, the demand for domestic sizes from that section usually being a later development. Eastern Kentucky operators have booked orders well on through July and August, at an average advance of 10c. on the ton for each month. On September business operators are finding it possible to hold out for higher prices. Little change for the better has been marked in the industrial demand, though it is considered that the situation with respect to the Kentucky market will improve shortly.

SOUTHERN AND MIDDLE- WESTERN

BIRMINGHAM

Coal market not quite as active, although a big railroad order was placed. Little improvement in coke. Pig iron slightly more active.

The market on both steam and lump coal fell of slightly, few orders being booked for either lump or steam coal. While some of the mines are running on full schedule, the majority are only working about four days a week. Both furnace and foundry coke remain quiet with little evidence of improvement in the near future. Blacksmith coal is about normal for this season of the year. While not quite as large a tonnage of pig iron was booked as last week, more orders were taken in smaller quantities, with prices about the same.

The placing of a contract by the Seaboard Air Line, involving between 500,000 and 600,000 tons of coal, was the main feature of the week. The order was distributed among three companies, the Pratt Consolidated Coal & Iron Co., the Alabama Fuel & Iron Co. and the Alabama Company.

INDIANAPOLIS

Indiana mines working about half-time. Usual number of contracts closed but coal not being ordered out. Prices at customary summer level, except on screenings. Domestic movement slow.

Conditions in the Indiana coal fields are at the usual summer quiet. Mine owners say they have closed an average number of contracts for the season but the coal is not being taken. The mines are on not much better than half-time and operators say this means that the buyers are on about the same schedule. The fact that no Ohio coal is in the market seems to have made no difference. Agents say coal from the Virginia fields can be had at about the same price as from the Indiana mines.

The fact that there is plenty of free coal on the market has not affected prices, as it has been found that concessions do not increase the demand, so the general policy is to hold prices at a fair level. Screenings are still scarce and command 90c. to \$1 as against the contract price of 80 to 90c. Among the factories the largest in the state are on short time but the smaller ones are running about normal. One operator says his largest buyer has closed down for the first time in many years.

The wheat harvest has begun in the southernmost counties of the state and will work rapidly north. It will make more work for the railroads and they will need more coal. Whether the increased activity will extend to related industries is what coal operators are waiting to see.

CHICAGO

Prospects for future beginning to brighten up. Improvement anticipated in steam and domestic coal after July 1. Smokeless market showing better form. Demand for screenings exceeds supply and price increases. Coke demand stronger for future delivery.

Railroad conditions take an important part in what is expected in the Chicago coal market. The railroads expect to

obtain the increase in freight rates which will mean that the curtailment in expenditures will be ended and naturally the coal market will be affected favorably. Most of the railroads close their fiscal year June 30 and so are spending as little as they possibly can for the time being. It is expected that after July 1 they will begin buying coal for storage as a heavy rush is looked forward to in the fall. Another factor in the expected improvement is that large orders are anticipated by the steel trade on account of the advanced freight rates.

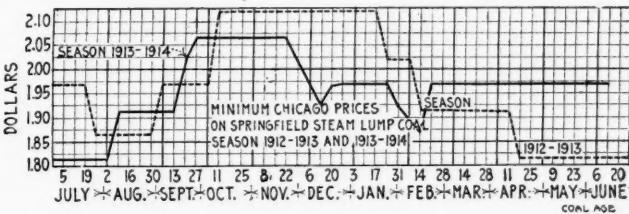
Although anthracite sales have been below normal since April 1, the year's business will be up to the usual figure, with rush deliveries during August, September and October. Reasonably strong conditions prevail in the smokeless coal market. While there is considerable of this grade offered at \$1 a ton, the larger companies are holding to the circular price of \$1.25 for mine run, on contract coal. There is little demand for lump and egg, but the supply is no better.

There is a variety of prices demanded for Franklin County coal. One company is getting some business at \$1.50 for lump, egg and No. 1 nut while another, now getting \$1.35, announces that the price will be advanced to \$1.50, July 1. Several companies are quoting \$1.25 and others have even gone below that figure. Mines in this district are running an average of three days a week. Prospects are fair in the Carterville district, with price conditions similar to those in Franklin County. With the demand for screenings increasing there is a scarcity evident which was not anticipated. During the week the price has increased about ten cents a ton for the better grade and five cents for the ordinary. Dull conditions still prevail in the spot market for hard coke, but an improvement is looked for during the second half of the year.

Prevailing prices at Chicago are:

	Springfield	Franklin Co.	Clinton	W.Va.
Domestic lump.....	\$2.07	\$2.30@2.40	\$2.12	
Steam lump.....	1.97		1.97	
Egg.....		2.30@2.40		\$3.95
Mine-run.....	1.87	2.15@2.25	1.87	3.05@3.30
Screenings.....	1.62@1.67	1.95@2.05	1.62@1.67	

Coke—Connellsville and Wise County, \$5@5.25; byproduct egg, stove and nut, \$4.65; gas house, \$4.25.



KANSAS CITY

Kansas City market improved. Demand from wheat belt causes slight increase in operations. Market steady on summer basis.

Movement of coal in this section has shown a distinct improvement during the past week. The wheat crop has materialized in good shape and threshermen are actually beginning operations, though it will be a week before all of the separators in the Kansas, Missouri and Oklahoma wheat belts are in full swing. Operating time has been increased as the result of the brisker movement, three days being the minimum in all quarters, with four and five the average. The market has held steady, and with a stiffening tendency which may result in a slight advance shortly. Some danger of a car shortage is felt, though railroads are coping with the situation effectively so far.

ST. LOUIS

Improved demand from country trade due to the heavy crops. An unexpected car shortage on the Iron Mountain causes apprehension over the outlook this fall. Prices unchanged but firmer.

There was a better tone to the high-grade market during the past week, occasioned perhaps by the fact that there is considerable country buying. This is largely in anticipation of the harvest and the coal for threshing purposes is beginning to move. This is not, however, affecting the Standard market any, and the same conditions exist in that field that have for several weeks past.

There has been practically no change in quotations, in either the high-grade or Standard field; screenings and steam sizes seem to be holding their own, but it is likely that in the next week there will be an advance in Carterville and Franklin County screenings on account of the gradually increasing car shortage. For five days straight the Iron Mountain failed to furnish cars, and the only apparent reason for this is that the road is not fixed financially to repair its

equipment. This road is in bad shape financially, while the C. & E. I., one of the other heavy coal carriers in the southern Illinois field, is in the hands of a receiver, and cars are not at all plentiful on it.

The Illinois Central and the Burlington are the only two roads out of the high-grade field that are financially strong. The Burlington does not enter St. Louis from the south, which leaves the Illinois Central as the main carrier and this road has never been able to furnish more than 35% of the equipment demanded by the mines during the fall months.

There was a dropping off in the orders for anthracite last week, and several cars were reported under demurrage at East St. Louis. This is mostly independent coal, and it is somewhat hard to move, being in open cars and in many cases drop bottoms which the dealers refuse to receive.

The market is now quotable as follows:

	Williamson and Franklin Co.	Big Muddy	Mt. Olive	Standard	Sparta
2-in. lump.....		\$1.15	\$0.80 @ 0.90	\$1.15	
3-in. lump.....					
6-in. lump.....	\$1.20 @ 1.35	1.25	1.00 @ 1.15	1.35	
Lump and egg.....	1.85 @ 2.15	\$2.00		1.15	
No. 1 nut.....	1.20 @ 1.35				
Screenings.....	0.85 @ 0.95		0.80 @ 0.85	0.70 @ 0.80	0.75 @ 0.80
Mine-run.....	1.00 @ 1.15		0.75 @ 0.80		
No. 1 washed nut.....	1.40 @ 1.50	2.25	1.50		
No. 2 washed nut.....	1.25 @ 1.35		1.35		
No. 3 washed nut.....	1.25 @ 1.30				
No. 4 washed nut.....	1.25 @ 1.30				
No. 5 washed nut.....	0.80 @ 0.85				

Coke—Gashouse \$4; byproduct, \$4.75, both f.o.b. St. Louis.

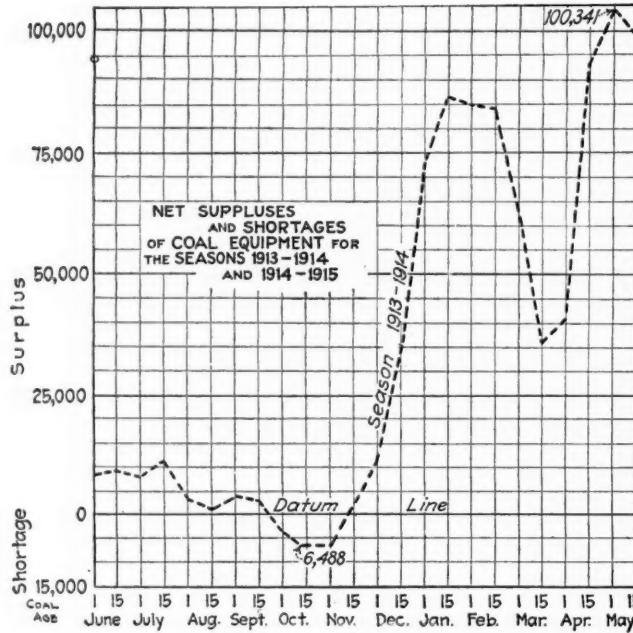
PRODUCTION AND TRANSPORTATION STATISTICS

THE CAR SITUATION

American Ry. Association reports surpluses and shortages of coal equipment for two weeks ended June 1, as follows:

	Surplus	Shortage	Net*
New England Lines.....	1,633	0	1,633
N. Y.; New Jersey, Del.; Maryland; Eastern Penn..	18,452	0	18,452
Ohio; Indiana; Michigan; Western Pennsylvania..	45,689	0	45,689
West Virginia; Virginia, North & South Carolina..	3,645	0	3,645
Kentucky, Tenn.; Miss.; Alabama, Georgia, Florida..	10,761	0	10,761
Iowa, Illinois, Wis., Minn.; North & South Dakota.	8,311	6	8,305
Montana, Wyoming, Nebraska.....	2,142	0	2,142
Kansas, Colorado, Missouri, Arkansas, Oklahoma..	1,497	0	1,497
Texas, Louisiana, New Mexico.....	226	0	226
Oregon, Idaho, California, Arizona.....	2,414	1	2,413
Canadian Lines.....	0	0	0
Total.....	94,770	7	94,763
Feb. 1 Feb. 15 Mar. 1 Mar. 15 Apr. 1 Apr. 15 May 1 May 15			
Surplus.....	85,489	84,775	64,822
Shortage.....	102	239	1,394
Net*.....	85,387	84,536	63,428

*Bold face type indicates a surplus.



COAL AGE

NORFOLK & WESTERN RY.

The following is a statement of coal handled by the N. & W. Ry. during May and the past four months of the current year in short tons:

	February	March	April	May
Pocahontas Field.....	942,477	1,161,793	1,156,670	1,239,653
Tug River District.....	204,074	246,490	221,344	263,155
Thacker District.....	198,228	274,786	232,181	280,148
Kenova District.....	71,401	88,616	96,116	101,768
Clinch Valley District.....	152,769	153,704	156,502	150,916
Other N. & W., Territory	3,694	2,741	2,827	2,596
Total N. & W. Fields.....	1,572,643	1,928,130	1,865,640	2,038,236
Williamson & Pond Creek				
R.R.....	26,314	43,865	79,828	74,875
All other railroads.....	67,518	140,123	171,818	225,561
Grand total.....	1,666,475	2,112,118	2,117,286	2,338,672

Distribution of shipments for April and May compare as follows:

	April	May				
	Shipped	Tipple	Total	Shipped	Tipple	Total
Pocahontas.....	1,066,583	16,336	1,082,919	1,123,694	16,249	1,139,943
Tug River.....	219,221	2,123	221,344	260,887	2,268	263,155
Thacker.....	222,770	9,411	232,181	270,356	9,792	280,148
Kenova.....	87,884	8,232	96,116	92,958	8,810	101,768
Total.....	1,596,458	36,102	1,632,560	1,747,895	37,110	1,785,014

Shipments of coke, entirely from the Pocahontas field amounted to 64,340 tons in April as compared with 60,949 tons in May.

FOREIGN MARKETS

Lower Coal Freights from Wales—The heavy fall in freights for coal from Cardiff may be seen in the table here-with. This table covers certain selected ports in which American coal exporters may be expected to have a special interest:

Ports	High-est in 1912	High-est in 1914	Low-est in 1914	Ports	High-est in 1912	High-est in 1914	Low-est in 1914
Alexandria.....	\$3.28	\$2.00	\$1.67	Gibraltar.....	\$2.55	\$1.67	\$1.39
Algiers.....	3.08	1.54	1.35	Havre.....	1.70	1.09	0.85
Barcelona.....	3.28	2.00	1.82	Montevideo.....	5.71	3.40	2.79
Bordeaux.....	2.02	1.20	0.96	Port Said.....	3.10	2.06	1.64
Cape Verde.....	3.04	1.82	1.58	Rio de Janeiro.....	5.95	3.52	2.85
Genoa.....	3.52	1.91	1.45	River Plate.....	6.07	3.71	2.79

COAL SECURITIES

The following table gives the range of various active coal securities during the week ending June 13:

Stocks	Week's Range		Year's Range		
	High	Low	Last	High	Low
American Coal Products.....	85½	96½	82
American Coal Products Pref.....	105	106	102
Colorado Fuel & Iron.....	27½	27½	27½	34½	24
Colorado Fuel & Iron Pref.....	140	140	140
Consolidation Coal of Maryland.....	102½
Island Creek Coal Com.....	50½	49	50
Island Creek Coal Pref.....	89½	87½	89½
Lehigh Valley Coal Sales.....	170	150	165
Pittsburgh Coal.....	20½	20	20½	23½	17½
Pittsburgh Coal Pref.....	89½	88½	89	93½	84
Pond Creek.....	18	17½	18
Reading.....	166	164½	165	172½	158½
Reading 1st Pref.....	89½	89	87½
Reading 2nd Pref.....	88½	88½	88½	93	87½
Virginia Iron, Coal & Coke.....	45	52	40	40
Closing		Week's Range		Year's Range	
Bid Asked		or Last Sale		
Colo. F. & I. g. n. s.f.g. 5s.....		92	92	May '14 91½ 90	
Colo. F. & I. gen. 6s.....		105	107½	June '12 101½ 103	
Col. Ind. 1st & coll. 5s. gu.....		73½	74½	June '14 73 72	
Cons. Ind. Coal Me. 1st 5s.....		70½	73	Mar. '14 73 70½	
Cons. Coal 1st and ref. 5s.....		89	91½	May '14 89 90½	
Gr. Riv. Coal & C. 1st g. 6s.....		89	99	Feb. '14 99½ 94½	
K. & H. C. & C. 1st s f g. 5s.....		98½	102½	Apr. '06 102 102	
Pocah. Con. Coll. 1st s f 5s.....		91½	93	Mar. '14 93 93½	
St. L. Rky. Mt. & Pac. 1st 5s.....		86½	86½	86½ 84 88½	
Tenn. Coal gen. 5s.....		78	80	77 Apr. '14 77 72	
Birm. Div. 1st consol. 6s.....		103	103	103 97½ 101	
Tenn. Div. 1st g. 6s.....		101	103	101½ May '14 101½ 103	
Cah. C. M. Co. 1st g. 6s.....		101	103	101½ June '14 101 101½	
Utah Fuel 1st g. 6s.....		101	101	101½ Mar. '14 101½ 101½	
Victor Fuel 1st s f 5s.....		84	73	Apr. '14 73 73	
Va. I. Coal & Coke 1st g. 5s.....		90	93½	May '14 90 95	

DIVIDENDS

Little Schuylkill Navigation Railroad & Coal Co.—Dividend of \$1.50, payable July 15 to holders of record June 11-14.

Coal & Iron National Bank—Regular quarterly dividend of 1½%, payable July 1 to holders of record June 10.

American Coal Products Co.—Regular quarterly dividend on both the common and preferred of 1¼%, payable July 1 to holders of record June 24.